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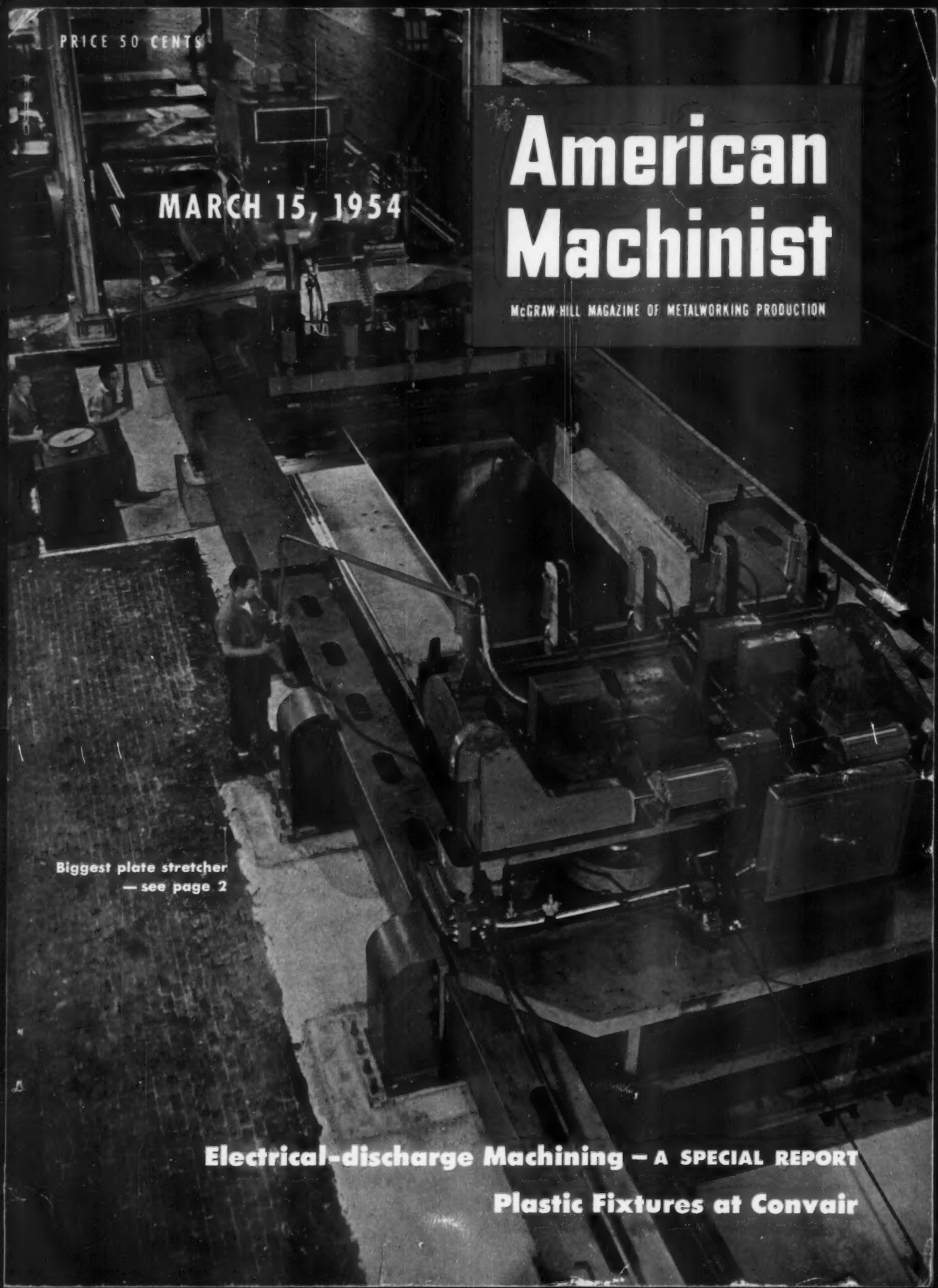
MARCH 15, 1954

American Machinist

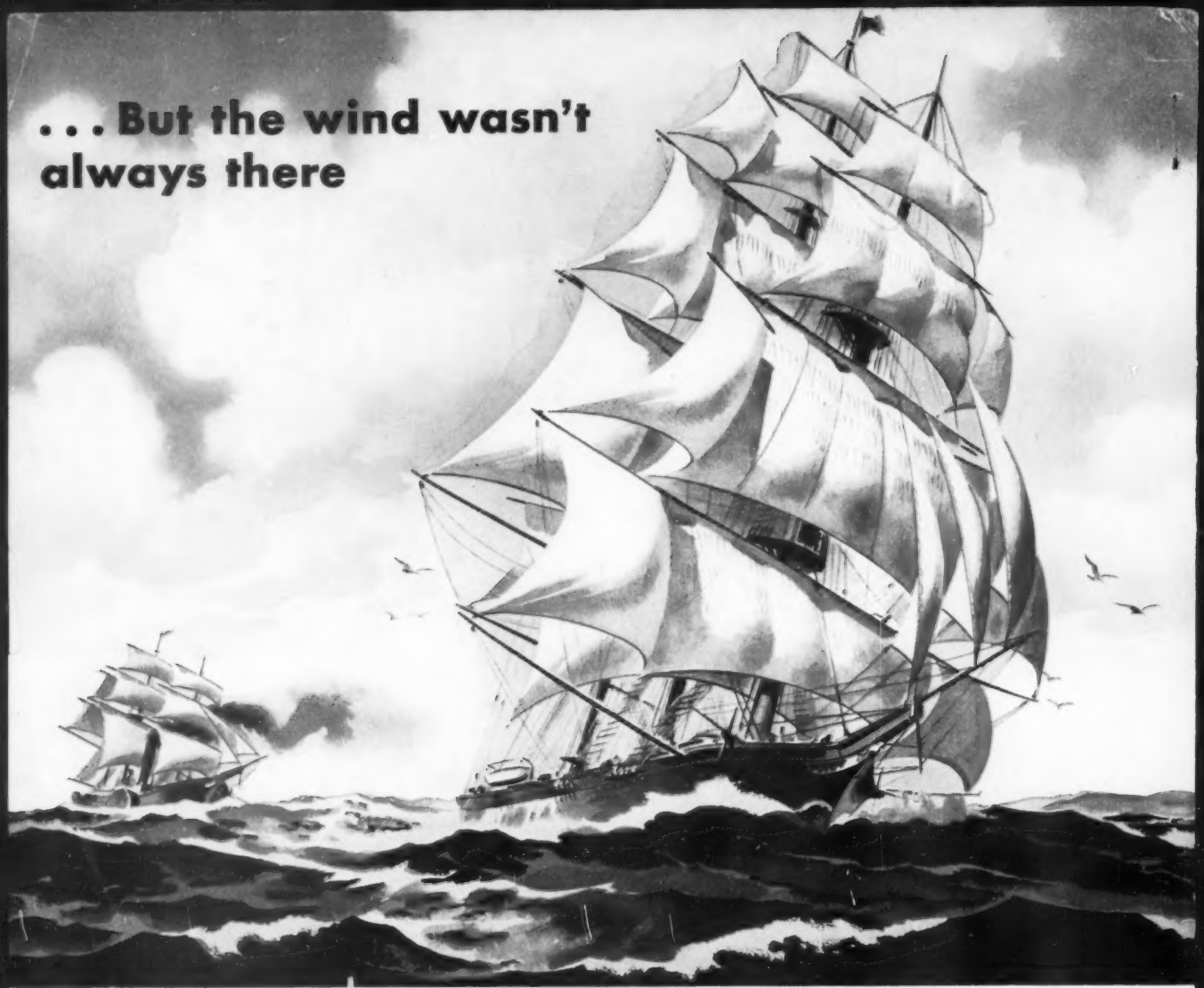
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Biggest plate stretcher
— see page 2

Electrical-discharge Machining — A SPECIAL REPORT

Plastic Fixtures at Convair



IN THE Clipper ship era of the 1840's 20 knots with a favoring wind was considered good time — as indeed it would be today. But the wind wasn't always there. In the long run steam won out in the competitive race.

We say, "That's progress" but it's really competition which makes the difference between historic failures and continuing success. In the case of the Clippers something better, more dependable came along — and it will always be that way.

Like everyone else in today's highly competitive market you're certainly looking for new ways to improve product quality and cut manufacturing cost. Very possibly we here at Heald can help. Heald automatic sizing, constant feed throttling, centerless grinding, faster cycles, versatility, transfer type Bore-Matics, battery type equipment and a host of other unique Heald features for faster, better precision finishing are available for a wide variety of jobs. We would welcome the opportunity to show you how a fresh Heald viewpoint can help — on long or short runs, single or multi-purpose setups.

Competition is wonderful when you're *ahead* of it. Our business is to keep you there. That's why IT PAYS TO COME TO HEALD.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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chips

STRETCHER . . . High-strength aluminum plate up to 2 in. thick and 40 ft long can be stretched in the 5-million-pound plate stretcher on our cover. In the plant of Kaiser Aluminum & Chemical Corp at Trentwood, Wash, it is the largest and most powerful in the world. The hydraulic unit is 81 ft long, 18 ft wide, and 9 ft high. It weighs 275 tons, can have a stroke up to 7 ft. Residual stresses from rolling and heat treatment are removed, and uniform properties developed by exerting uniform strain over the entire plate at one time. Because the process is unusual and will probably be applied more extensively with use of machined integrally stiffened structures in aircraft, we have included a 2-page explanation of it as well.

ELECTRICAL DISCHARGE . . . Two years ago this month, we brought you the first comprehensive story on arc machining. In a 12-page Special Report in this issue, we bring the process, now more correctly called electrical-discharge machining, up to date. Advances have been noteworthy.

PLASTIC TOOLING . . . H H Rosenbaum, plastics engineer at Convair-San Diego, gives detailed step-by-step procedure for making both cast-plastic stretch-form dies and laminated-plastic fixtures for drilling, sawing, gaging and other applications . . . There are also tooling stories on machining large crankshafts in England, a group of Shop Shots from Studebaker, Rohr, Gorton, ACF, and Chance Vought, a review of Navy methods for gaging bores from star gage to recorder, recommendations from Ryan Aeronautical on best air-tool practice, and a quick page on hardened guides.

PERSONNEL . . . To help satisfy your itch for more on how to handle people, one article deals with the perennial problem of pilferage.

OIL RECOVERY . . . We have attempted, during the past few months, to show a variety of systems for oil recovery from chips. Allis-Chalmers, at LaPorte, Ind, has an unusual one. Here are details on equipment and procedure by H W Lindsay, works manager, and L F Graves, metallurgist.

CUTTING FORCES . . . Determining cutting forces can be simplified for shop use. Wm E Kennicott, chief engineer of Kennametal, does it for you in a page. You can now run your own tests.

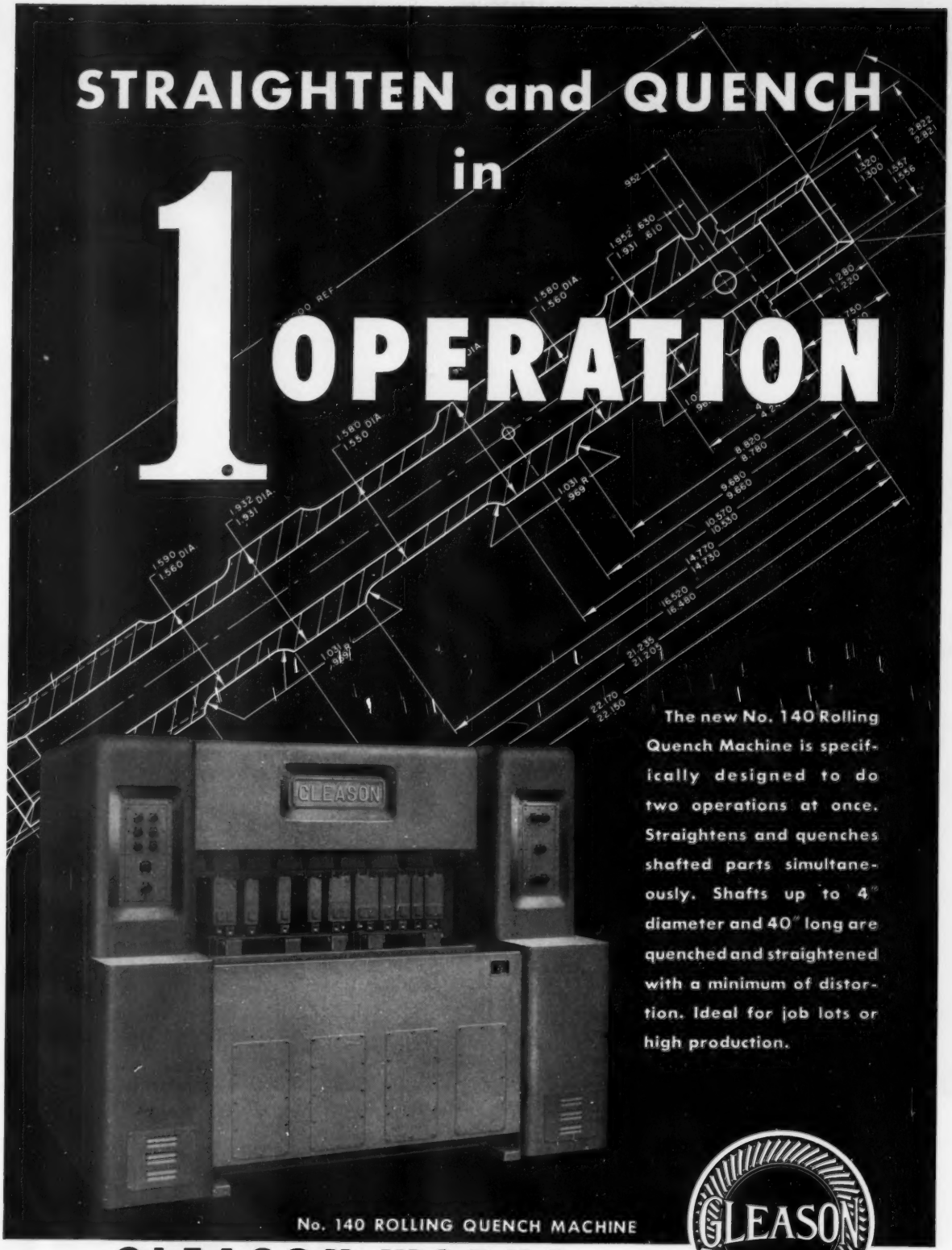
FINISHING . . . Leonard Giglio, foreman at Hartford Screw Machine Co, gives the lowdown on barrel finishing in three fact-packed pages. He gives department layout, abrasive mixtures, and potential savings.

INDEX . . . Our 1953 Index is now available on request. Lists 1656 articles by 353 different authors. This does not include news items and other material of primarily momentary value.

COMING . . . Mar 29 *AM* will include an important Special Report: How to Choose and Use Hydraulic Presses. There'll be a simplified explanation of gear cutting, too, plus articles on shell boring, lighting, and first description of a new metalworking process.

HAROLD H ROSENBAUM, plastics engineer, Consolidated Vultee Aircraft Corp, San Diego, Calif, was born in Plainfield, NJ, in 1913. He attended University of Detroit, Polytechnic Institute of Brooklyn, and Rutgers University, where he received his BS in chemistry in 1939. He was with Convair from 1940-45 as a research engineer in plastics. From 1945 to 1951 he obtained diversified experience in plastics, working for a consulting firm, an educational institute, and in sales for a rubber company. He rejoined Convair in 1951 and in his present capacity he is the company's SPI member and the Convair representative on the AIA, ARTC Subcommittee W-38, W-64 and W-69. He describes Convair plastic fixtures in our lead article.

STRAIGHTEN and QUENCH in 1 OPERATION



The new No. 140 Rolling Quench Machine is specifically designed to do two operations at once. Straightens and quenches shafted parts simultaneously. Shafts up to 4" diameter and 40" long are quenched and straightened with a minimum of distortion. Ideal for job lots or high production.

No. 140 ROLLING QUENCH MACHINE

GLEASON WORKS

BUILDERS OF BEVEL GEAR MACHINERY FOR OVER 85 YEARS

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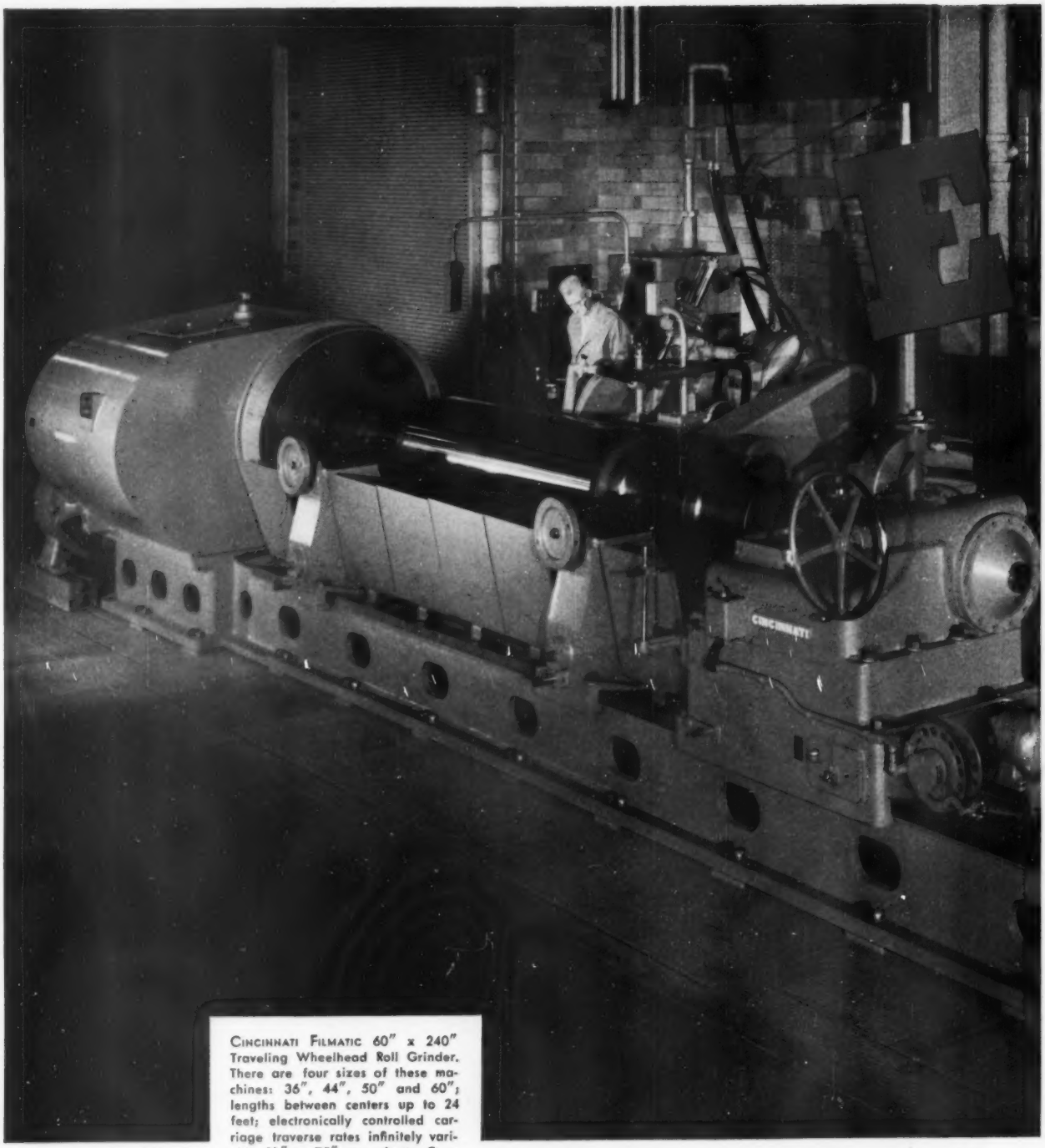
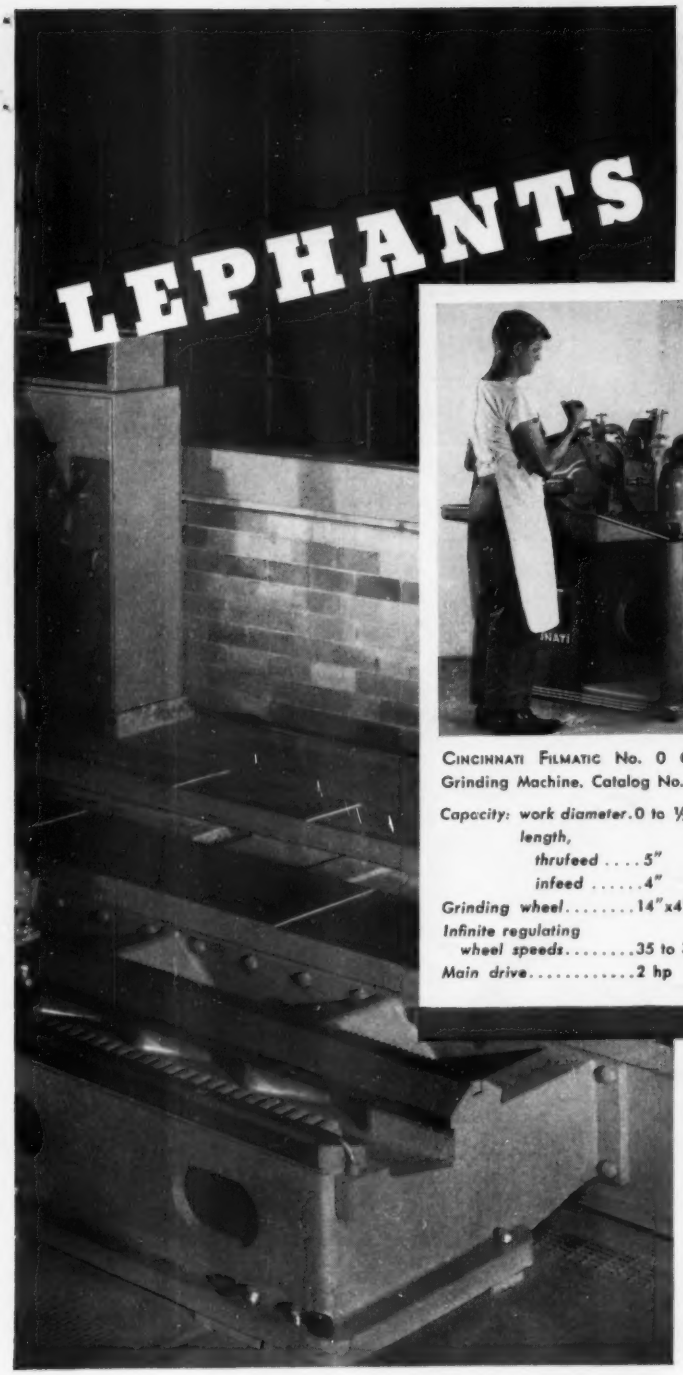


CINCINNATI FILMATIC 60" x 240" Traveling Wheelhead Roll Grinder. There are four sizes of these machines: 36", 44", 50" and 60"; lengths between centers up to 24 feet; electronically controlled carriage traverse rates infinitely variable ¼" to 75" per minute. Complete details on request.

FILMATIC

CINCIN



LEPHANTS and Rabbits

CINCINNATI FILMATIC No. 0 Centerless Grinding Machine. Catalog No. G-576-2.

Capacity: work diameter.0 to ½"
length,
thrufeed . . . . 5"
infeed . . . . . 4"
Grinding wheel. . . . . 14"x4"x5" hole
Infinite regulating wheel speeds. . . . . 35 to 320 rpm
Main drive. . . . . 2 hp

and 160 in-between sizes of Cincinnati Filmatic Grinding Machines

Offer you the World's Finest Selection of Equipment for Reducing the Cost of Precision

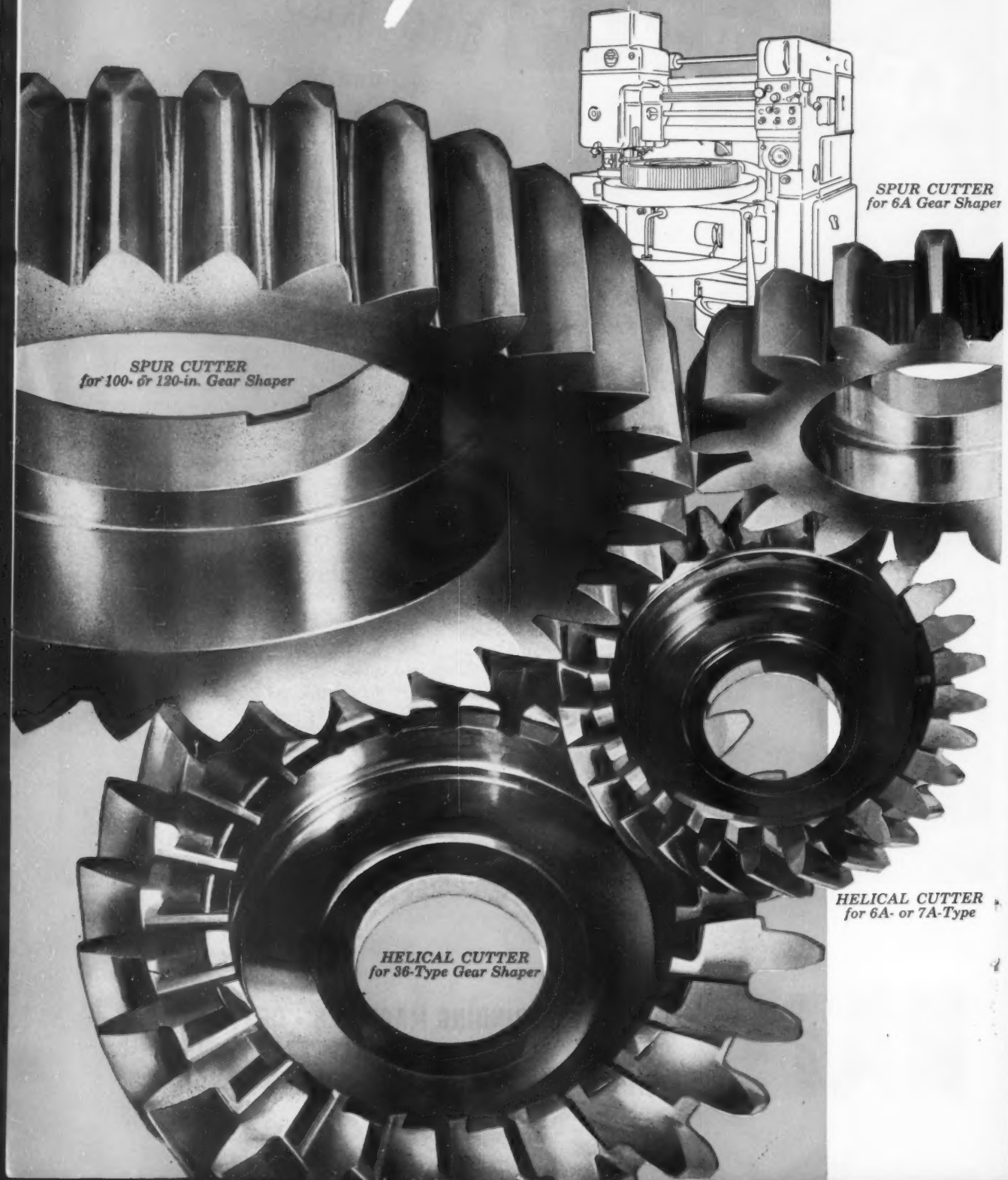
Low cost of precision stems largely from the wise selection and application of modern machine tools. In cylindrical grinding, it's comparatively easy to make the best selection . . . CINCINNATI offers 162 sizes, types and styles of precision grinding machines. Two examples are illustrated here, a 60" x 240" Traveling Wheelhead Roll Grinder, weighing 149,500 pounds . . . about 45 times the weight of the No. 0 Centerless Grinder. Products ground by CINCINNATI FILMATIC centertype and centerless grinding machines range from surgical sutures .004" diameter, to steel rolls 60" diameter . . . 15,000 times as large and 665,000,000 times as heavy. ¶Our engineering service and field servicemen will help you with problems concerning low cost of precision and performance. They have C.G.I's extensive experience in precision grinding to guide them. ¶Right now, while you're thinking about it, we suggest that you find out more about CINCINNATI Grinding Machines by writing for our general catalog No. M-1776. The same data will be found in Sweet's Machine Tool Catalog.

CINCINNATI GRINDERS INCORPORATED
(Subsidiary of The Cincinnati Milling Machine Co.)
CINCINNATI 9, OHIO

NATI

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

THE *Fellows* LINE OF



SPUR CUTTER
for 100- or 120-in. Gear Shaper

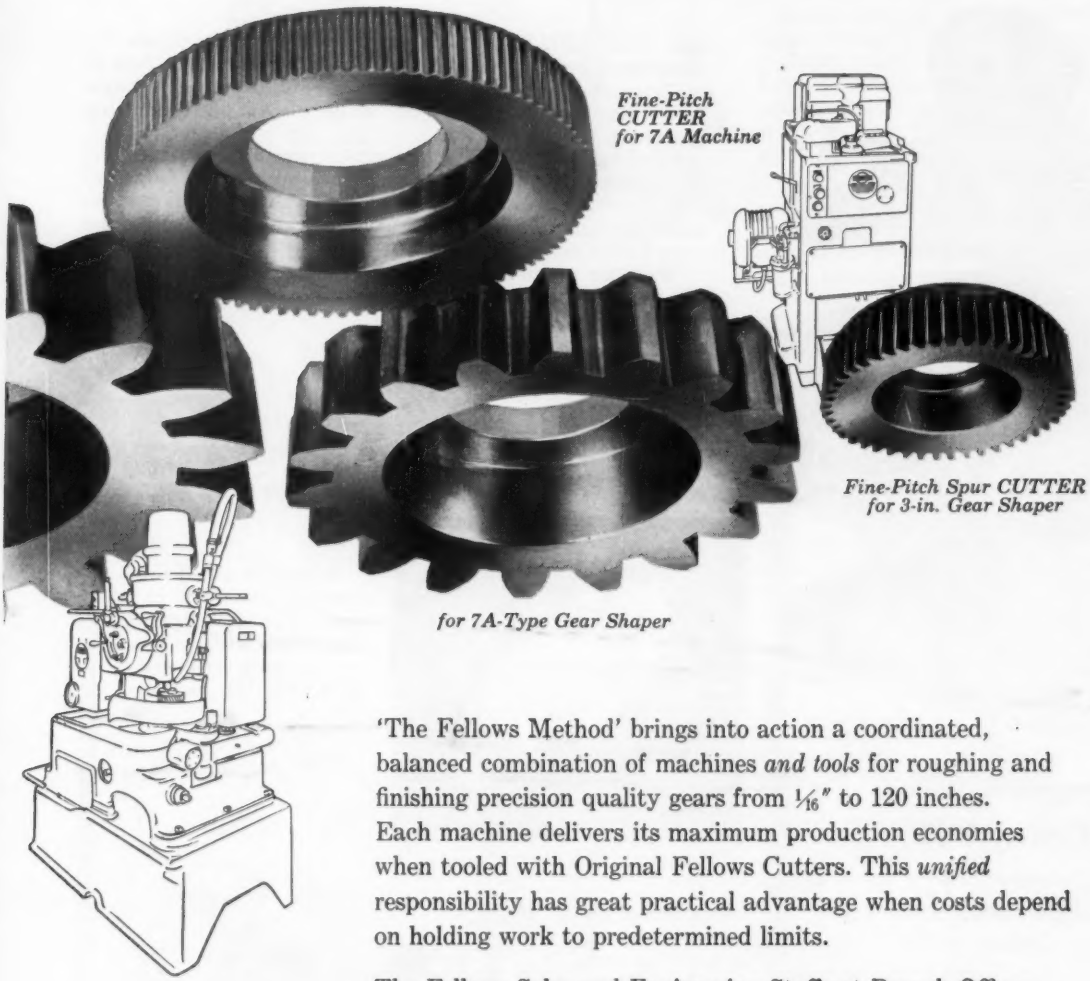
SPUR CUTTER
for 6A Gear Shaper

HELICAL CUTTER
for 36-Type Gear Shaper

HELICAL CUTTER
for 6A- or 7A-Type

MACHINES AND TOOLS

delivers Quality Control *in All Sizes*...



Fine-Pitch CUTTER for 7A Machine

Fine-Pitch Spur CUTTER for 3-in. Gear Shaper

for 7A-Type Gear Shaper

'The Fellows Method' brings into action a coordinated, balanced combination of machines *and tools* for roughing and finishing precision quality gears from 1/16" to 120 inches. Each machine delivers its maximum production economies when tooled with Original Fellows Cutters. This *unified* responsibility has great practical advantage when costs depend on holding work to predetermined limits.

The Fellows Sales and Engineering Staffs at Branch Offices and at Headquarters are men of broad experience and practical skill in helping customers combine specified accuracy with close control of costs. All Fellows Offices are at your service.

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Announcing The VAN NORMAN No. 38M Miller

One of 10 New Ram Type Models Especially Designed to Give You Greater "Flex-ability" and "Cut-ability"

For "CUT-ABILITY", the 10 HP spindle motor drives the cutterhead only . . . provides ample power for every type of milling cut. The new box type column and base plus the new heavy knee, saddle and table assemblies assure maximum rigidity and accuracy.

For "FLEX-ABILITY", the new heavy adjustable cutterhead, new larger extended ram and heavy knee with front and rear directional power and manual feed controls. Ram extends to its maximum range of 29". New design permits maximum cuts within entire ram range.

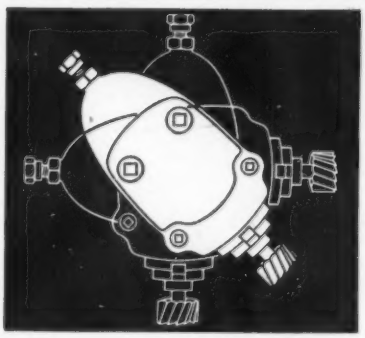
Write for complete details on the new, modern Van Norman No. 38M Ram Type Milling Machine.

No. 38 M

Table: 64" x 14"
Spindle Motor: 10 HP
Feed Motor: 1½ HP

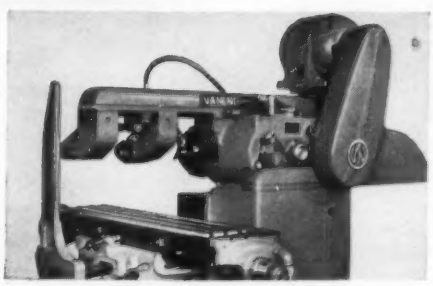
Interested in Extra Vertical and Table Range: See Your Van Norman Dealer

LOOK AT THESE "PLUS" FEATURES FOR MAXIMUM "FLEX-ABILITY"



Adjustable cutterhead permits horizontal, angular and vertical milling on one machine. Reduces work reset-ups, eliminates idle machine time.

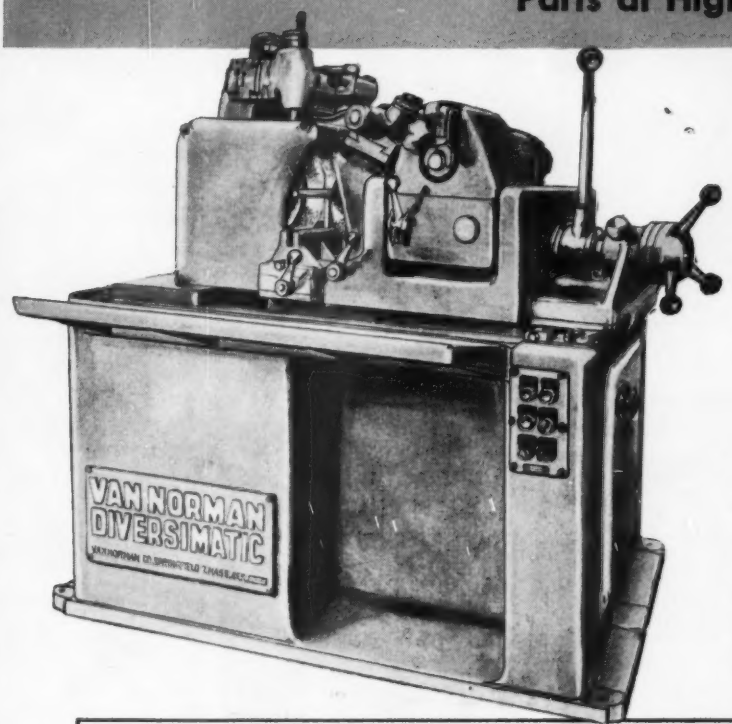
Machine shown with overarm, arbor supports, and outerbrace.



VAN NORMAN makers of—Ram and Column Type Milling Machines, Cylindrical Grinders, Spline and Gear Grinders, Oscillating Radius Grinders, Special Production Grinders, Centerless Grinders.

New Van Norman *Diversimatic*® Centerless Grinder

Gives "Close-Tolerance" Grinding of Small Parts at High Production Rates



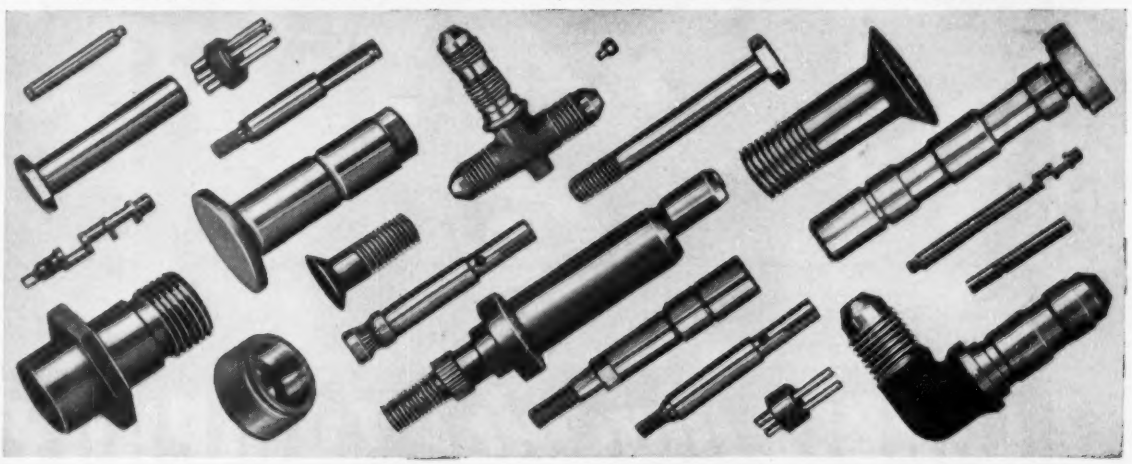
This new grinder provides fine finish to close tolerances at high production rates. It finish grinds parts from solid . . . or finish grinds rough-turned pieces. When equipped with a Crush Forming Attachment, it form grinds and does profile work.

These Diversimatic® Features Cut Grinding Costs!

- Heavy Duty grinding wheel is mounted on double-row super precision ball and roller bearings, sealed and lubricated for life, assuring trouble-free operation.
- Spindle requires no warm-up period.
- Grinding wheel and regulating wheel dressers hydraulically-operated.
- Infinitely variable ¼ h.p. regulating wheel drive, 15 to 800 r.p.m.

Get the full facts. See how this versatile grinder can cut your grinding costs on small shafts, formed shapes, parts of two or more diameters or special contours.

CENTERLESS GRIND PARTS LIKE THESE FASTER, MORE ECONOMICALLY ON THE DIVERSIMATIC



VAN NORMAN CO., Springfield 7, Mass.

5 THREADING
by LANDIS

LANDIS *Machine* COMPANY

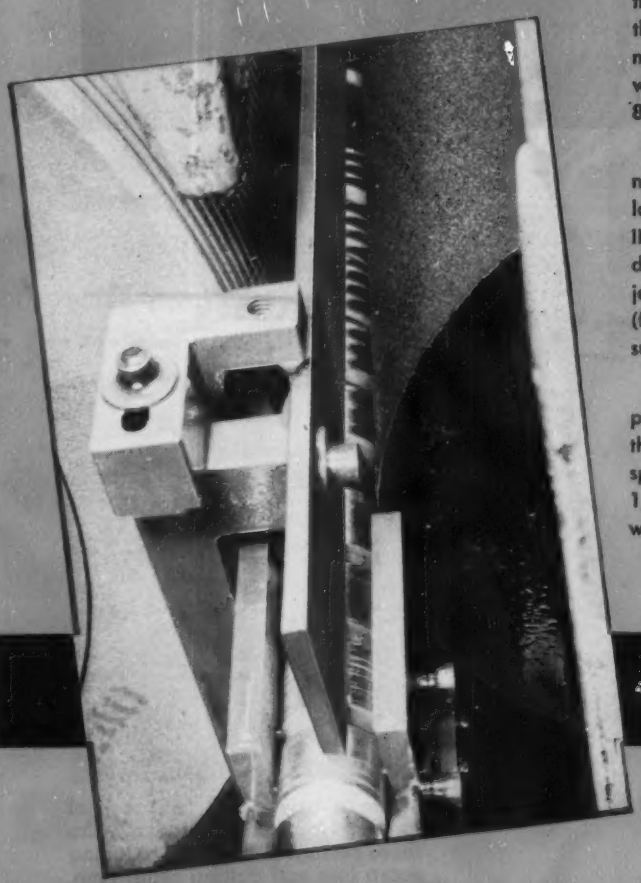
THE WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF THREAD

PASSES ELIMINATED

Centerless Thread Grinders

BENDIX-WESTINGHOUSE in Elyria, Ohio, recently installed two *LANDIS* #1 Centerless Thread Grinders for threading slack adjuster gear worms used in automotive air brakes. This new threading method resulted immediately in fewer threading operations, fewer rejects, savings in critical materials, and longer product life.

Gear worm blanks are made of alloy steel, heat-treated to a 285-311 Brinell hardness. Former methods had required 7 separate passes to complete the threads. Threads were rough-cut before heat-treating in one pass, then finish-ground in six passes after heat-treating.



Using the *LANDIS* Centerless Thread Grinders, threads are now completed after heat-treating in two operations. Both machines are arranged for "upgrinding", a method developed by *LANDIS*, which allows up to 30% greater work surface speeds while maintaining concentricity and finish. Upgrinding allows deeper cuts, and threads are finished in two passes. For example, on the machine producing 3½ pitch threads on 1¼" gear worms, roughing takes a .108" cut, finishing .089", with 8 pounds of metal removed every hour.

Other important advantages have resulted from the new process. By grinding threads after heat-treating, locked-in stresses are eliminated, and BENDIX-WESTINGHOUSE reports show that product life has been doubled. In addition, a reduction in the number of rejects and the elimination of a nubbing on the workpiece (formerly required to facilitate threading) has effected substantial savings of critical materials.

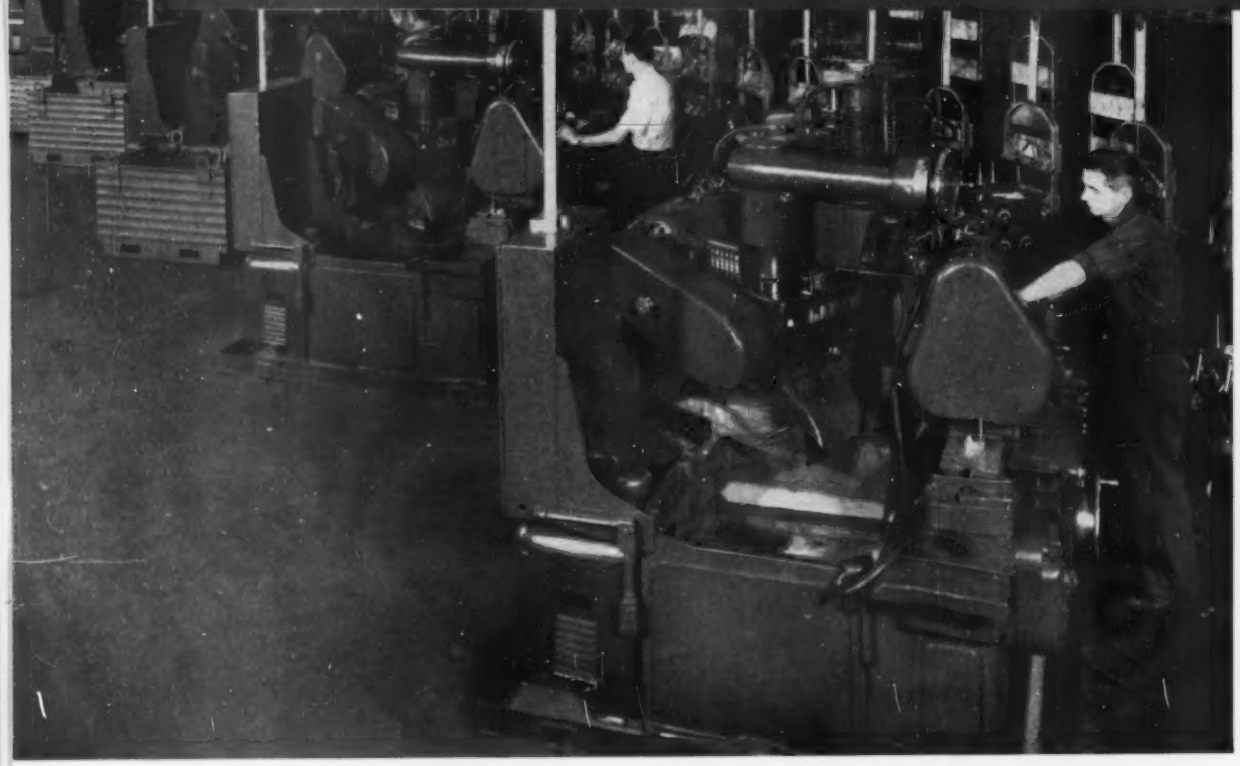
This successful production story can be retold in your plant. Centerless Thread Grinders, built exclusively in the United States by *LANDIS*, are designed for high-speed mass production of screw threads ranging from 1/16" to 4¾" in diameter. Please send specifications when writing for additional information.

LANDIS REG. U.S. PAT. OFF. TRADE-MARK

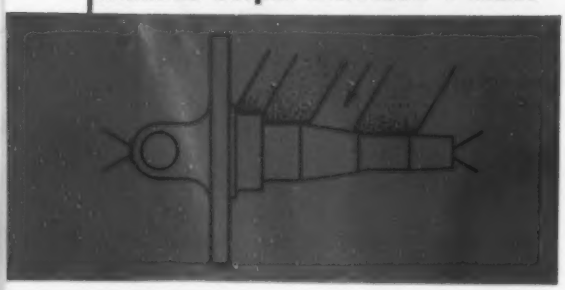
WAYNESBORO PENNSYLVANIA

GENERATING EQUIPMENT

How Modern Landis Grinders



Machine output increased 4 times



Separate grinding operations for the three diameters and three blending radii of front wheel spindles are now combined into one on modern Landis Plain Grinders.

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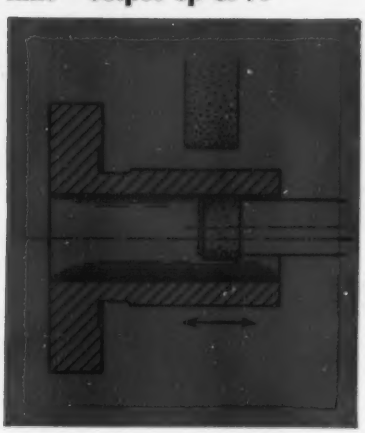
Flexible operation cuts setup time—output up 37%



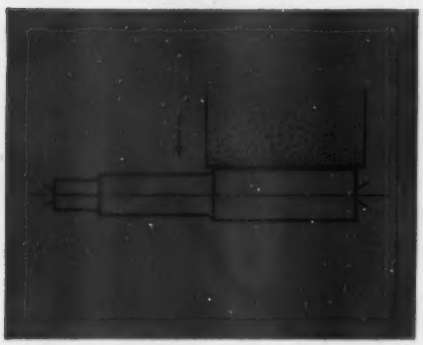
Modern operating features of Landis Universal grinders make these savings possible by reducing scrap loss and cutting setup time.

LANDIS

precision grinders

Cut Costs and Increase Output

25% over-all savings by replacing obsolete plain grinder

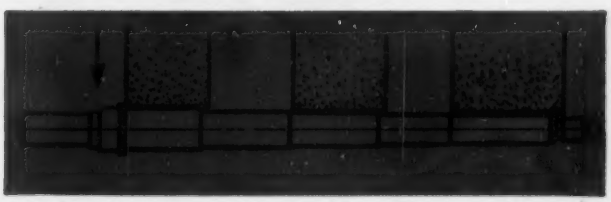


The modern high production features of Landis plain grinders jumped production of these tap blanks from 280 to 400 per day. Semi-automatic cycle includes hydraulic infeed and timer.

Gives double production with half the machines

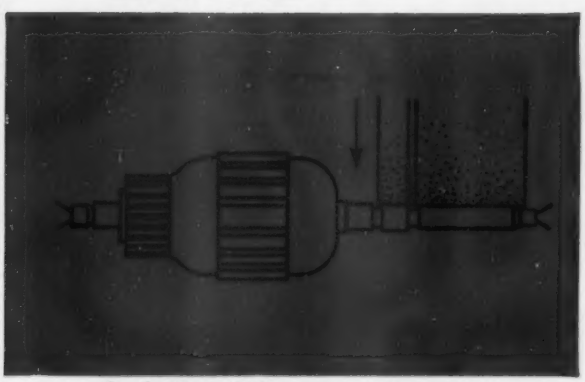
Heavier cuts possible on modern Landis Centerless Grinders enable an automotive plant to grind gear-shift rails at a faster rate. Jump in output is from 2300 to 4800 pieces per day with only two machines instead of four.

Eliminate extra grinding operations



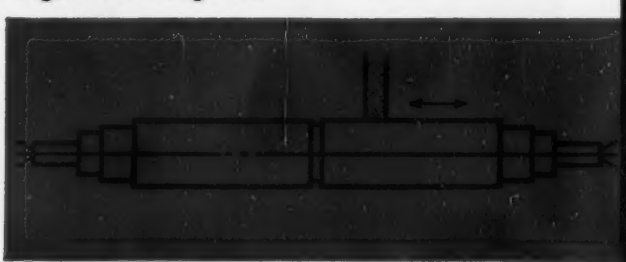
Grinds 3 diameters and a shoulder in one operation on a modern Landis Type IW Multiple Wheel Grinder. Concentricity assured by grinding all diameters at one setup.

Modern operating features increase output 40%



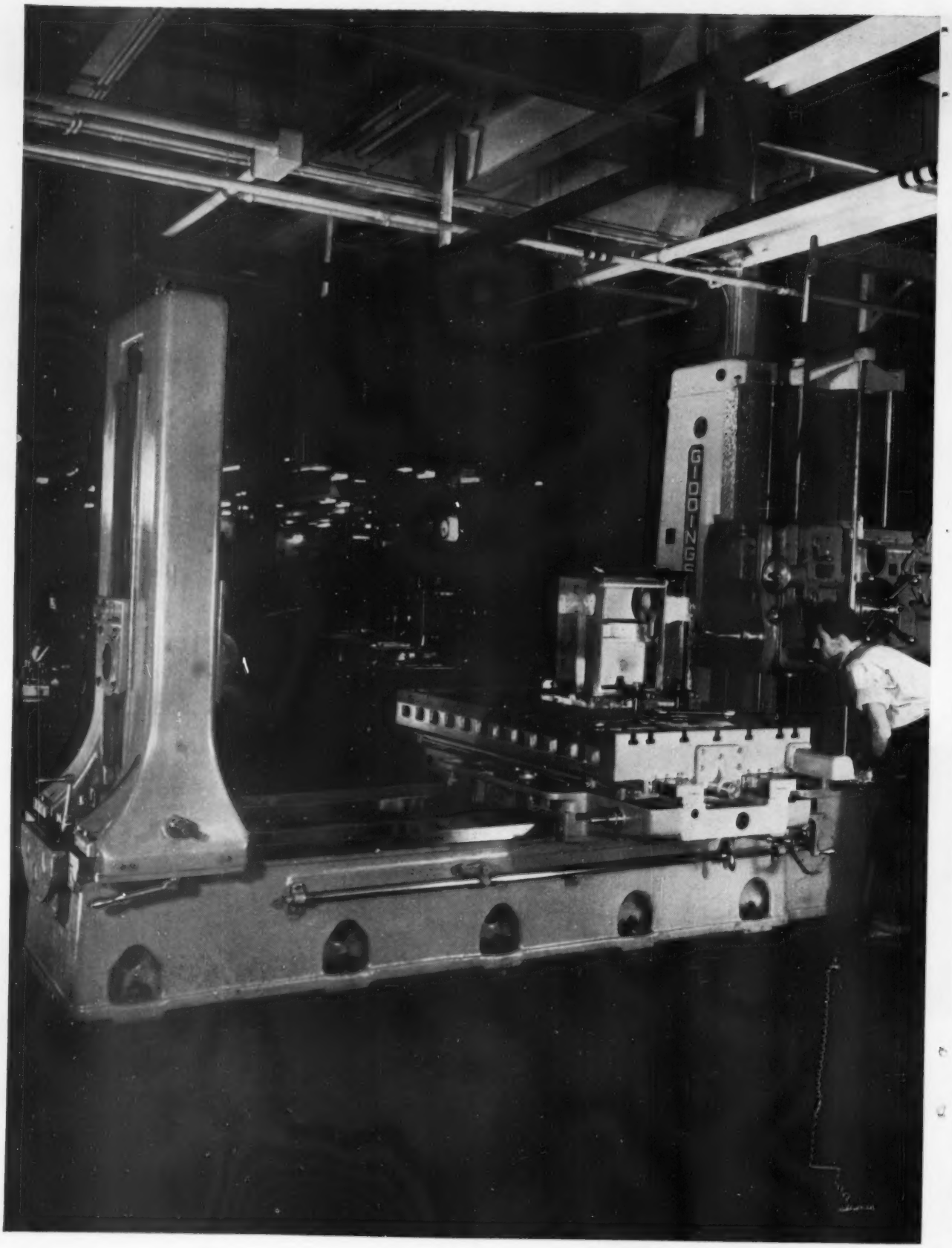
Production: 210 pieces per hour
Hydraulic feeds and timed grinding cycle of modern Landis 4" Plain Grinder increased output of armature shafts. Replaced hand operated machines.

Grinding time reduced 30% on large modern grinder



Modern Landis Grinder permits heavier cuts on printing press cylinders; eliminates extra passes once required.

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U.S.A.


GIDDINGS

Pace-setter...

often copied, never equaled

This G&L 340-T Horizontal Boring, Drilling and Milling Machine . . . like all G&L tools . . . is highly versatile, superbly built. And it's years ahead of its time in design

Compare horizontal boring machines feature by feature, advantage by advantage. Study the quality of their construction, the basic components and accessories or attachments available. You'll soon discover why the table type G&L 340-T is unmatched in its class for capacity, versatility and long-lived precision.

From its 4" dia. spindle to its simplified gear change and direct-reading dials—the 340-T's advanced design gives you 45 faster, easier speed selections from 10 to 1300 rpm. You have the option of standard or built-in rotary tables in several sizes . . . standard or increased working lengths of bed or columns. Hardened and ground bed and saddle ways are standard.

Further, the 340-T can be equipped with the G&L Automatic Electric Positioning device for simplification of close-tolerance sequence operations from a single setup. In fact, with a 340-T, you get the exact machine for your work — a machine that feature for feature, advantage for advantage cannot be matched.

For complete details on the 340-T or 350-T (5" dia. spindle) table type Horizontal Boring, Drilling and Milling Machines — contact your G&L representative or write for catalog No. 30-T.

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty machine tools — Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines; Vertical Boring Mills; and Davis Cutting Tools

Beat Rising Production Costs . . .

FOR YOUR PRESENT GRINDING JOBS

The new Pratt & Whitney Model "D" has everything it takes in construction and design to handle your present surface grinding jobs faster, more accurately. Easy to operate, easy to maintain, it will make every grinding man hour more productive.

OR TO REPLACE OTHER METHODS

As a simple cost analysis will prove, many planing, milling and other machining operations can be handled far more economically on a versatile P&W Model "D" Grinder. Here are important opportunities to save time, reduce costs and obtain closer tolerances and finer surface finishes.

COST-CUTTING FEATURES

- **CENTRALIZED CONTROL** . . . arranged for maximum convenience means extra operator efficiency with minimum fatigue.
- **HEAVY CONSTRUCTION** . . . Bed, Wheel Head and Spindle and Column are all built for added stability, heavy duty production and long life with minimum maintenance.
- **POWERFUL MOTOR** . . . to handle tough jobs faster. 30 hp regularly furnished; 40 hp optional.
- **IMMEDIATE PRODUCTION GRINDING WITHOUT WARM-UP** . . . and without loss of accuracy, reduces non-productive time.
- **HIGHER TABLE SPEEDS** . . . from *2 to 100 fpm*, permit the use of much harder, longer lasting wheels. Wheel costs are greatly reduced, work speeded up. Wide range provides the *right* speed for practically any material.
- **PRECISION CONTROL for TABLE TRAVERSE** . . . Operation is through *twin* hydraulic cylinders with throttle control on the *return* side. This provides the same speed in either direction, prevents surge when speed is suddenly reduced, prevents creep in slow speed and eliminates coasting when stopped.
- **MEETS J.I.C. SPECIFICATION BOTH ELECTRICALLY AND HYDRAULICALLY!**

CARRIAGE STRAPS for JIG BORER

Cast Iron, 2½" x 23", 3 pieces per load, ¼" stock removed. Grinding time per 5.4 minutes per load to produce precision flatness.

COUNTERWEIGHT CHAIN SHEAVES

Soft Steel, 2¾" OD, 1" face, 39 pieces per load, 1/16" stock removed. Grinding time per load only 3.4 minutes.

CONTROL BOX SUPPORT CLAMP

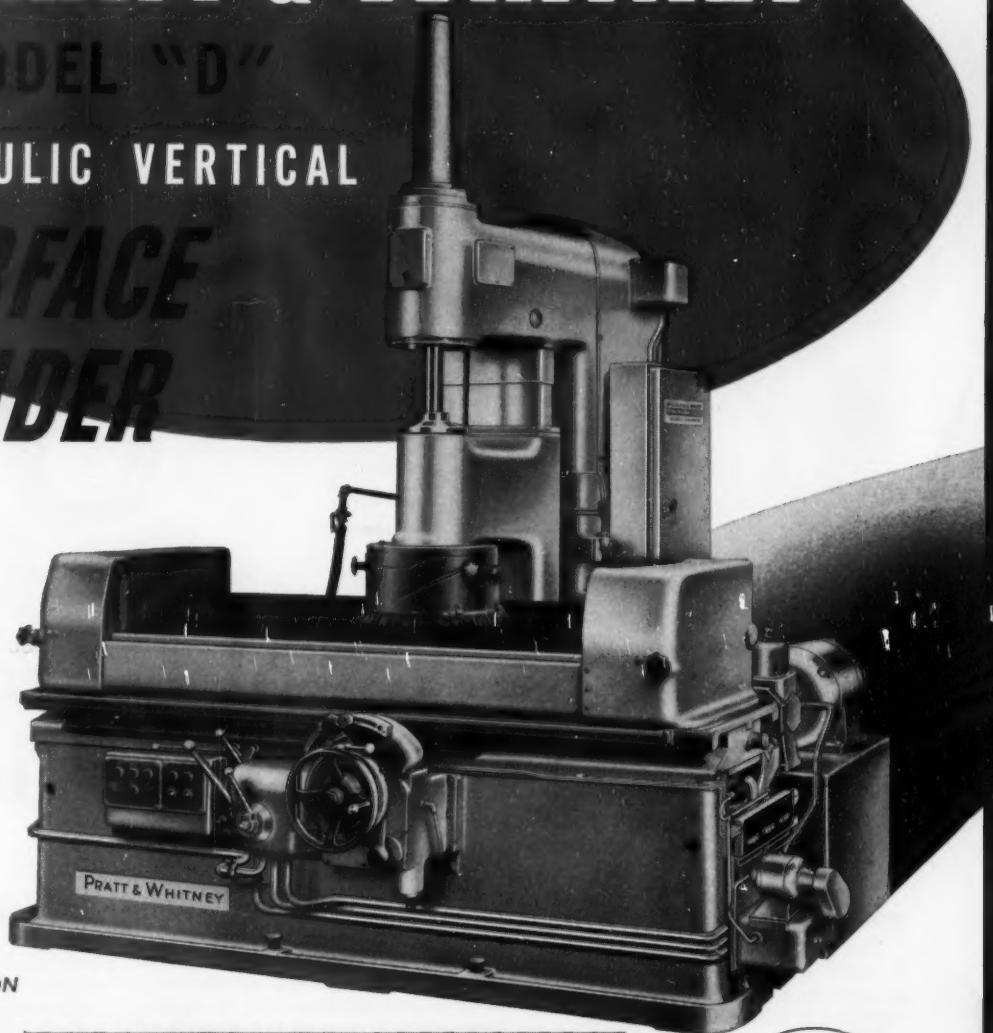
Cast Iron, 4½" ID, 5½" OD, 9 pieces per load, 1/16" stock removed per side. Grinding time only 5.6 minutes.

MODERNIZE with the NEW

PRATT & WHITNEY

MODEL "D"

HYDRAULIC VERTICAL SURFACE GRINDER



WHEEL DIAMETER

14" Ring Wheel or

17" Segmental Wheel

TABLE WORKING SURFACE

12" x 36" or

12" x 60"

SEND NOW FOR COMPLETE INFORMATION

See how the new Model "D" can help you beat rising production costs. Write on your company letterhead for your

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND COMPANY

WEST HARTFORD 1, CONNECTICUT, U.S.A.

SINCE 1860

MODERNIZE with PRATT & WHITNEY REPLACE FOR PROFIT

First Choice for Accuracy

BRANCH OFFICES . . BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DALLAS (The Stacey Co.) • DETROIT • HOUSTON (The Stacey Co.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT. . . . WEST HARTFORD

MACHINE TOOLS • CUTTING TOOLS • GAGES

Norton announces...

Your product parts will perform better — and gain in value — when the product-improving "Touch of Gold" is added in Norton's new Job Lapping Department

A new, enlarged job lapping service

Now you can improve your product quality with precision lapped parts!

The new Norton Job Lapping Service is ready to help you improve product quality and performance — by furnishing parts to your exact specifications.

Complete and modern in every detail, the new department is manned by expert personnel, operating Norton machines for every type of lapping. Results are checked on the latest electrical and optical inspection equipment, while precision accuracy is further assured by careful atmosphere control. The scope of jobs that can be handled is broad, covering:

Materials — Practically unlimited in range, including hardened steel, stainless steels, stellite facings, cast iron, nonferrous pressed and die-cast parts.

Types of Lapping — Single and parallel face flat lapping, to specifications ranging from stock removal to optical flatness. Also, external cylindrical lapping to high precision requirements.

Workpiece Capacities — Flat work up to 24″ across. Cylindrical work from 1/16″ diameter by 1/2″ long to 2″ diameter by 8″ long.

Meeting Your Needs Exactly — The entire project is under direct supervision of Norton Lapping Engineers, pioneers in the development of mechanical lapping processes and machines. They are prepared to work out the best lapping techniques for your requirements. For full details, see your Norton Representative or write us direct. NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize, Modernize With NEW

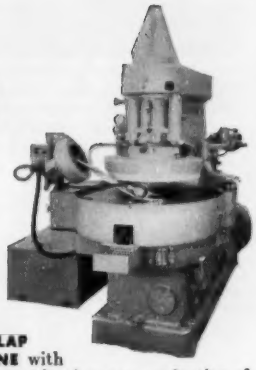
NORTON

GRINDERS and LAPPERS

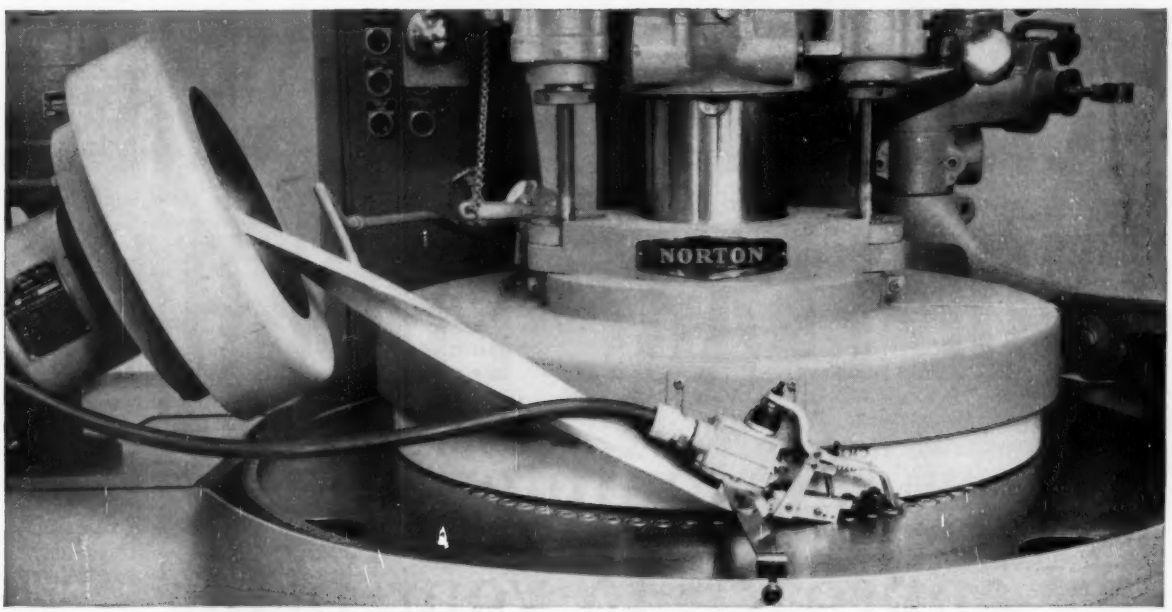
Making better products... to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit • *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5

Norton Thru-Feed Lapper gives you the "TOUCH OF GOLD" for small, flat parts



NORTON 26 HYPROLAP LAPPING MACHINE with automatic loading features that increase production of small, flat parts difficult to handle manually as much as 4 to 1 . . . as many as 8000 pcs/hr.



AUTOMATIC LOADING ARRANGEMENT of Norton 26 Hyprolap lapping machine makes sure parts are in correct position before entering feeding trough . . . prevents ganging up . . . directs work in a path that assures even lap wear.

NEW, built-in automatic loading adds extra advantages to Norton 26 Hyprolap*

You can make 4-to-1 savings in lapping small, flat parts . . . by adding the "Touch of Gold" that adds to profit by cutting costs. Investigate new Norton 26 Hyprolap lapping machines with the exclusive built-in thru-feed mechanism.

Here's why:

1. You speed up production. Loading and lapping operations handle parts as fast as 8,000 pieces per hour.

2. You cut handling. Loading and unloading are completely automatic.

3. You reduce downtime. Work path traverses the entire working surface of each lap . . . promoting even wear . . . reducing the frequency of lap dressing.

4. You cut out operations. This lapper removes stock down to .0002" tolerances . . . makes surfaces parallel to .000025" . . . in many instances without pre-grinding of parts.

5. You use less skilled help. Filling feed hoppers and removing finished-work baskets are the only manual operations.

No wonder 4-to-1 savings are a matter of record with the new Norton Hyprolap with built-in automatic loading!

Send for Bulletin 852-7. Also submit samples of your work for production estimates. Standard hopper-feed Hyprolap machines take work up to 1¼" diameter. Modifications handle larger work. NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize Modernize With **NEW**

NORTON

GRINDERS and LAPPERS

Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit

*Trade-Mark Reg. U. S. Pat. Off.

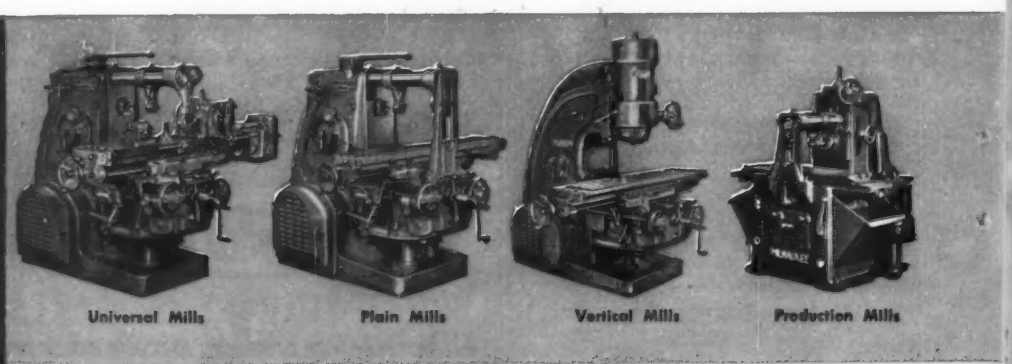
Don't wait....

Investigate

KEARNEY & TRECKER'S TOOL-LEASE PROGRAM

...the common sense approach to your plant modernization problem

Here are a few of the many new Kearney & Trecker machines available for Tool-Leasing



Here's the most significant opportunity ever offered machine tools users

In these times, modernization is the soundest approach to meeting increasingly competitive conditions. And the best way to modernize — to improve products, cut costs, gain productive flexibility — is to retool with new machines. Today, Kearney & Trecker's new Tool-Lease Program offers you an unmatched opportunity to "junk the clunkers" that are nibbling away at your profits. It's time to act. Don't wait — investigate!

These are only a few of the advantages Tool-Lease offers you

In the first place, you can try out new machines in your own plant . . . without being obligated to purchase them. Secondly, you can get hitherto impossible flexibility and capacity to take advantage of changing production requirements without the risk of obsolescence. Last, but not least, you can expand production without tying up working capital, going into debt, or impairing future borrowing capacity.

Tool-Lease helps you get the exact milling or boring machines you need

Under Tool-Lease, you can rent any Kearney & Trecker standard knee or bed type milling machine or precision boring machines. If you require special machinery or heavy-duty CSM bed-types, special agreements will be considered.

Three basic plans give you varying options to continue or terminate the lease or purchase the equipment.

For complete details on Tool-Lease . . . help in analyzing your milling and precision boring needs — see your Kearney & Trecker representative or mail coupon to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

TOOL LEASE
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS
EQUIPMENT ®

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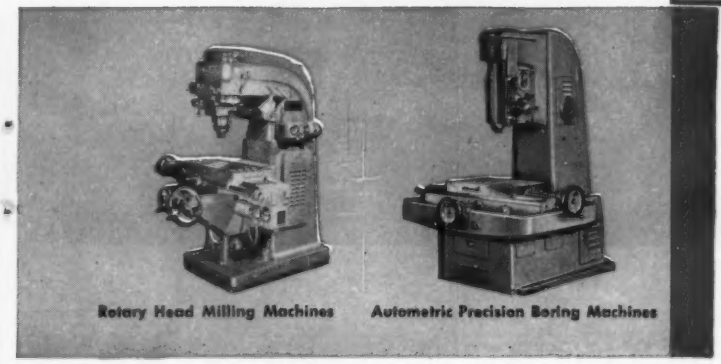
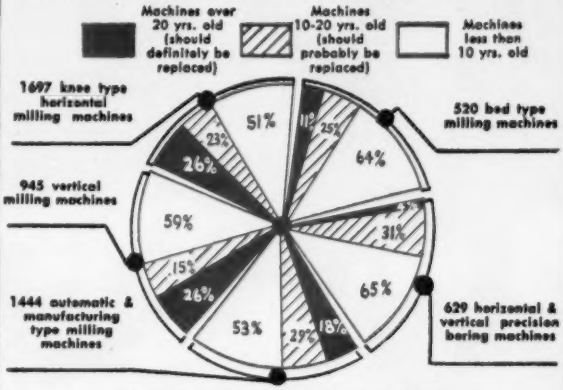


Rotary Head Milling Machines — Automatic Precision Boring Machines

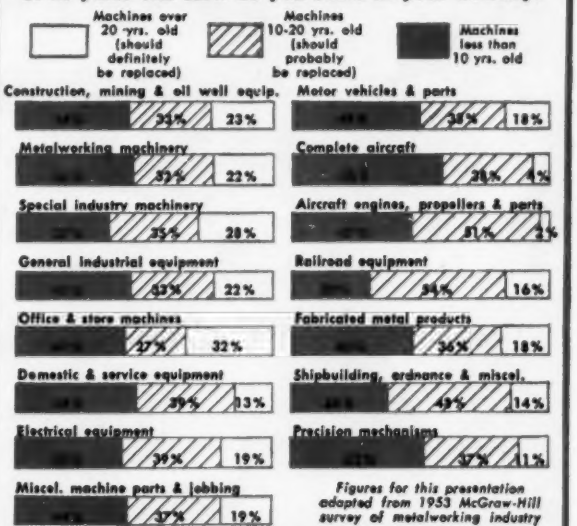
THE CRITICAL PICTURE OF CREEPING OBSOLESCENCE . . . AND HOW TO STOP IT!

Let's take a typical basic industry as an example — Agricultural equipment. Of the 5199 standard knee type horizontal, vertical, bed and manufacturing milling machines and precision boring machines in use today — *which could be replaced by Tool-Lease equipment*—26% are 10-20 years old, 19.9% are more than 20 years old.



The picture is similarly startling in 15 additional basic industries

The Agricultural Equip. and 15 other industries listed are using 150,825 standard knee-type horizontal, vertical, bed and manufacturing milling machines and precision boring machines. 18% are over 20 years old, 38% are 10-20 years old. How do you stand in your industry?


Machines over 20 yrs. old (should definitely be replaced)
Machines 10-20 yrs. old (should probably be replaced)
Machines less than 10 yrs. old
Construction, mining & oil well equip. 25% 23%
Metalworking machinery 32% 22%
Special industry machinery 35% 28%
General industrial equipment 33% 22%
Office & store machines 27% 32%
Domestic & service equipment 39% 13%
Electrical equipment 39% 19%
Miscel. machine parts & jobbing 37% 19%
Motor vehicles & parts 38% 18%
Complete aircraft 39% 4%
Aircraft engines, propellers & parts 31% 2%
Railroad equipment 34% 16%
Fabricated metal products 36% 18%
Shipbuilding, ordnance & miscel. 43% 14%
Precision mechanisms 37% 11%

Figures for this presentation adapted from 1953 McGraw-Hill survey of metalworking industry

A break-down on your industry will be furnished on specific request.

Kearney & Trecker Corporation
6784 W. National Ave.
Milwaukee 14, Wis.

Please send me Bulletin TL-10A with details on the Tool-Lease Program.
☐ Check here if you would like to have a representative call on you as soon as possible (or call Milwaukee, GReenfield 6-8300).

Name.....

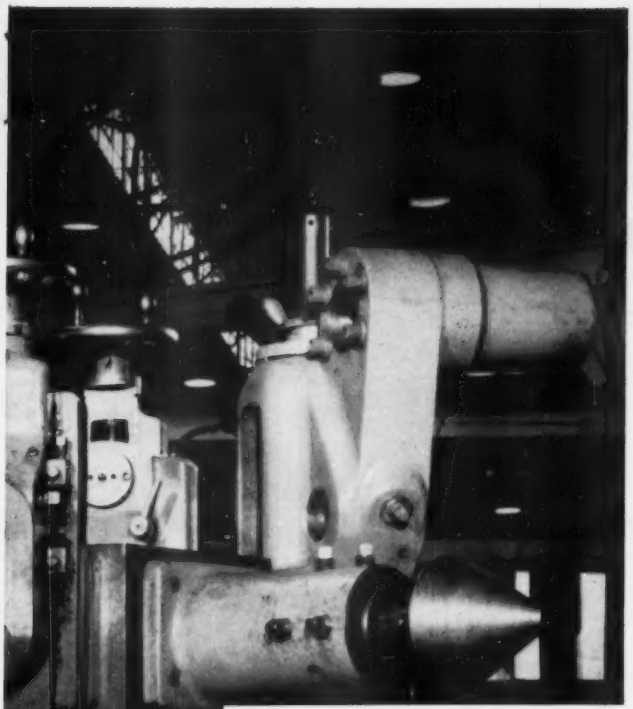
Title.....

Company.....

Address.....

City.....Zone.....State.....

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &



Here's a good example of what happens when a part is machined on the *right* machine with the proper tooling!

The machine was a new Warner & Swasey 4-A Turret Lathe installed in 1953 at the Emsco Manufacturing Company plant at Houston, Texas. It replaced an 8-year-old saddle type turret lathe.

Previous time for machining a large steel forging was 1 hour 54 minutes. This involved boring a hole to .001" tolerance, facing the end, a two inch turning operation on the 11" O.D., single pointing a 30° angle two inches long, grooving a 1½" wide square groove on the O.D., and breaking the corners.

After the job was transferred to the new Warner & Swasey, and following the setup and tooling recommendations of our Field Engineer, *the operation was completed in 30 minutes!*

Another operation transferred to this Warner & Swasey was machined in one-fourth the previous time! On a third part the operator produced 13 hours' work in one shift!

Machining time cut from 1 hr. 54 min. to 30 minutes!

Translating these time savings into production, Emsco reports that production of parts transferred to the Warner & Swasey has been increased by 32%. Operators like the machine's ease of handling and its ability to hog off metal.

This is a record of just one machine, but it emphasizes the profit possibilities open to you when the job is done on the *right machine,* properly tooled, and job-analyzed by a turning specialist . . . a Warner & Swasey Field Engineer. Call him in on your replacement problem. He's a good man to work with.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

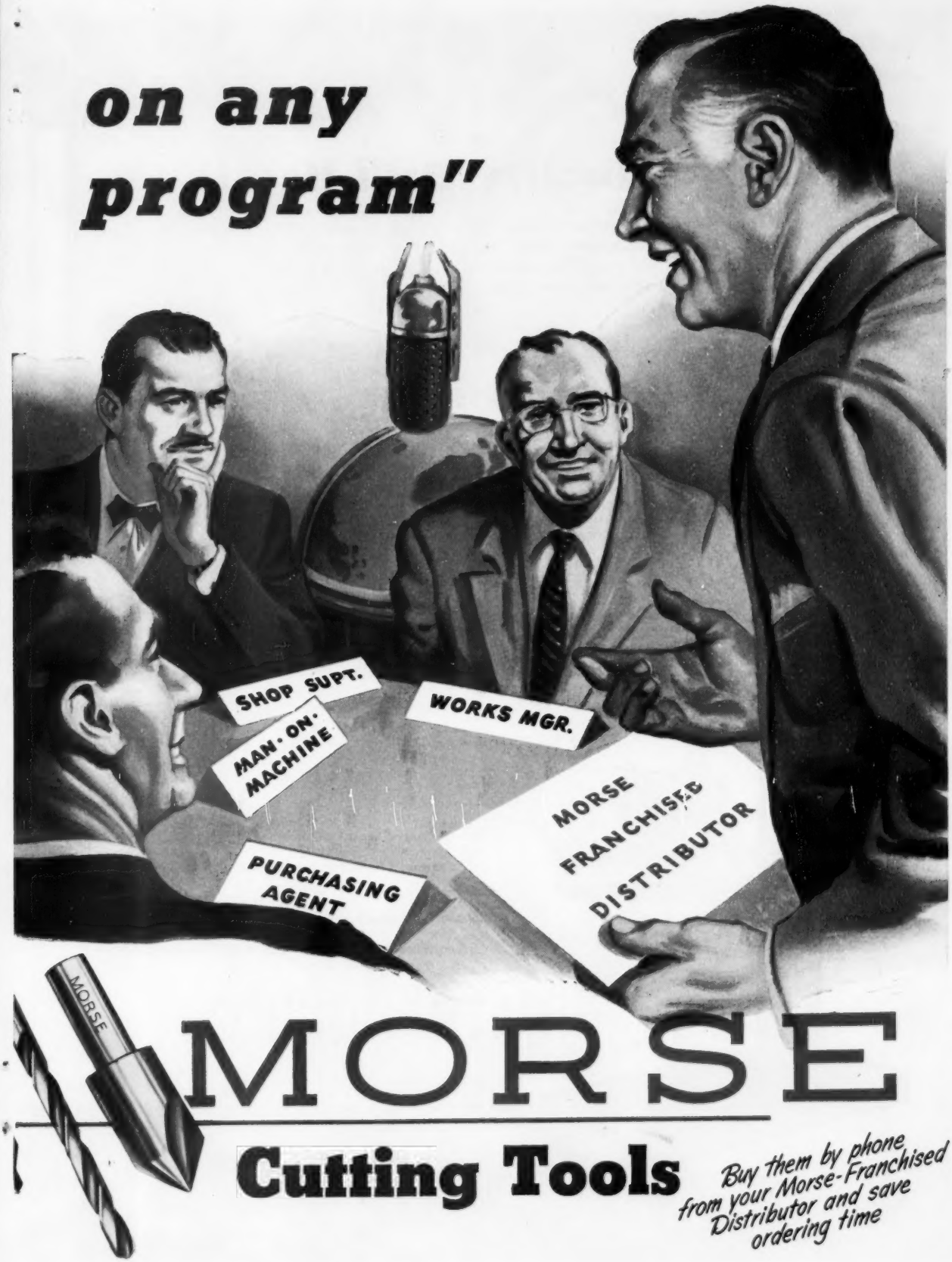
He scores highest cutting-tool "quiz

...your Morse-Franchised Distributor!

No matter who brings up the tough questions on cutting-tool applications, your Morse-Franchised Distributor has the *right* and *ready* answers. Plus the hard-earned practical experience to go out in your plant with your men and prove the soundness of his recommendations.

Yes, he helps you to get the most for your money out of the finest and most complete line of cutting tools that money can make . . . *the* Morse Line of Drills, Taps, Dies, End Mills, Counterbores and Cutters. So when *you* need the right answers *right now* to a tough problem in cutting tool application, call your Morse-Franchised Distributor. He'll guide you right and save you money . . . *every time.*

MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASSACHUSETTS
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco



MORSE

Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

This is a Quality Drill Head

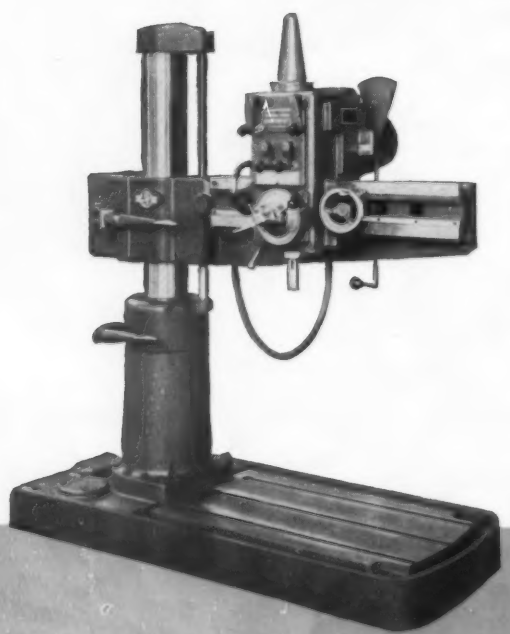
It provides 9 spindle speeds in geometric progression from 80 to 2420 rpm. It has six rates of power feed—.0025″ to .020″. All controls are conveniently located. The alloy steel spindle is counterbalanced by an adjustable spring. The entire mechanism is force-spray lubricated.

It is Standard on Cincinnati 3′7″ Radials costing only $3565*

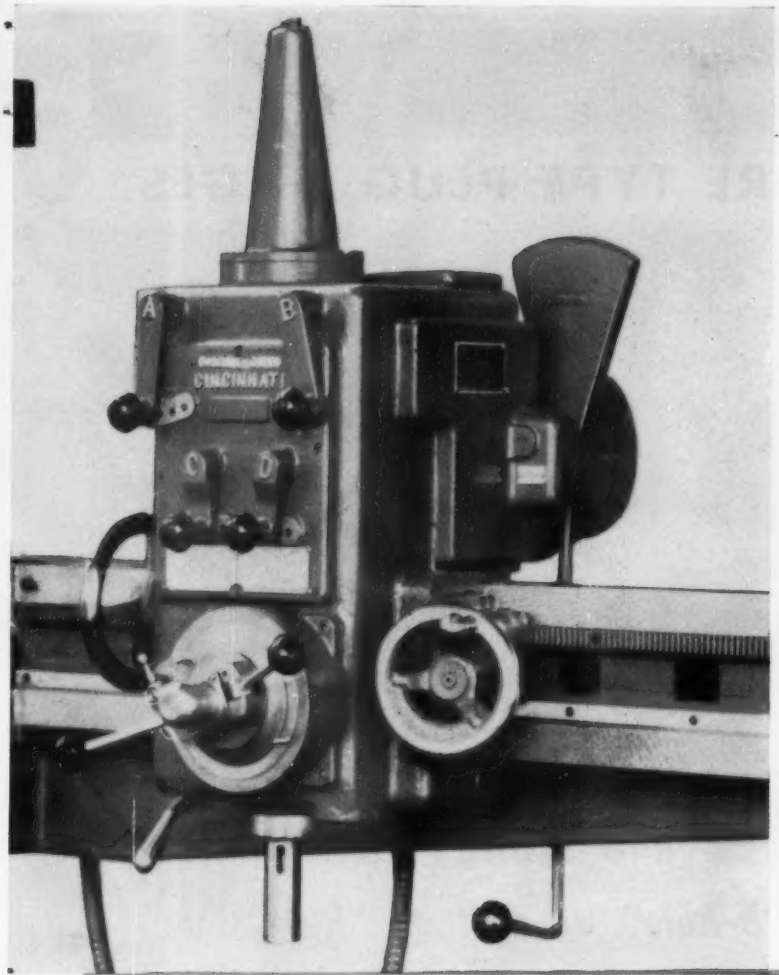
For any shop with drilling jobs of 1″ and under, the Cincinnati Radial offers important moneysaving advantages. Low in first cost—low in maintenance—Cincinnati Radials can do the bulk of your drilling jobs. They free expensive equipment for the heavy, special jobs.

For name of local dealer, complete catalog information and prices, write on company letterhead to: Cincinnati Lathe & Tool Co., 3243 Disney, Cincinnati 9, Ohio.

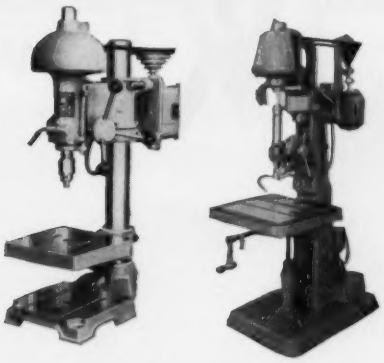
*FOB factory. Prices subject to change without notice. Price includes 220, 440 or 550-volt, 50 or 60-cycle, 2 or 3-phase, 1800-rpm, 1-hp, a-c main drive motor; ½-hp, a-c arm motor and controls. No. 3 MT spindle.

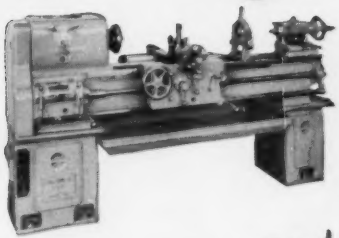


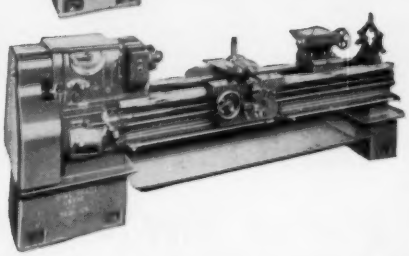
1. Unit construction throughout.
2. Simple, direct drive.
3. All-geared head.
4. Self-contained feed transmission.
5. All speed and feed transmission gears of hardened alloy steel.
6. All shafts mounted on antifriction bearings.
7. Ground tubular steel column mounted on anti-friction bearings.
8. Multiple-disc clutches for spindle drive.
9. Hardened and ground head rail.



There is also a complete line of Cincinnati Lathes—Floor and Bench Drilling Machines



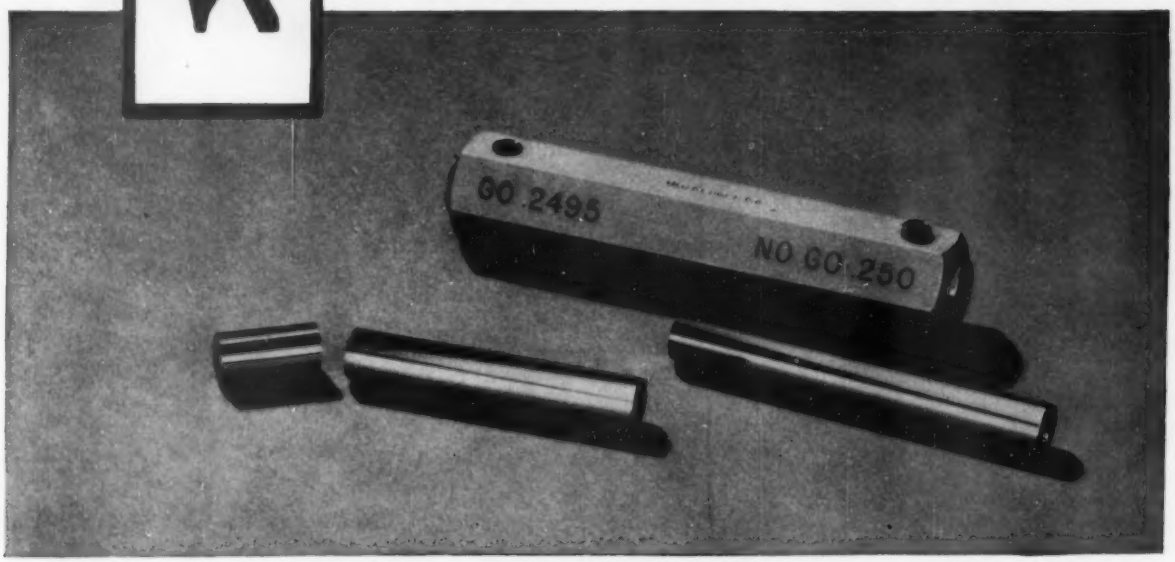




center on . . .

cincinnati lathes and drills

VK WIRE TYPE PLUG GAGES



VASTLY LONGER-LIVED *and* MONEY-SAVERS . . .

because they're "Cut-Off-Able" as well as "Reversible"

As a Van Keuren agent put it, "They're not only reversible, they're cut-off-able." And that means when you buy Van Keuren Wire Type Plug Gages, the sizes below ⅜" may be cut off when ends become worn and as many as from five to ten gages made available from the 1⅞" and 2" long units. It is not only economical and practical to use Van Keuren Gages but it is a very simple operation to cut off the ends by following instructions furnished on request. The illustration above shows clearly the cut-off and reversible features.

VK Wire Type Gages are available in ZZ to XX accuracies in sizes from .001" to 1.000". They are furnished in alloy tool steel, high speed steel, chromium plate or tungsten carbide. Whatever the gaging job, the extra length provided in VK units will save you money. It will also pay you to take advantage of VK deliveries. In many cases we can ship your requirements from stock.

VK Wire Type Plug Gages are fully described in Catalog & Hand Book No. 35, available on request by writing to: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

VK

35th YEAR

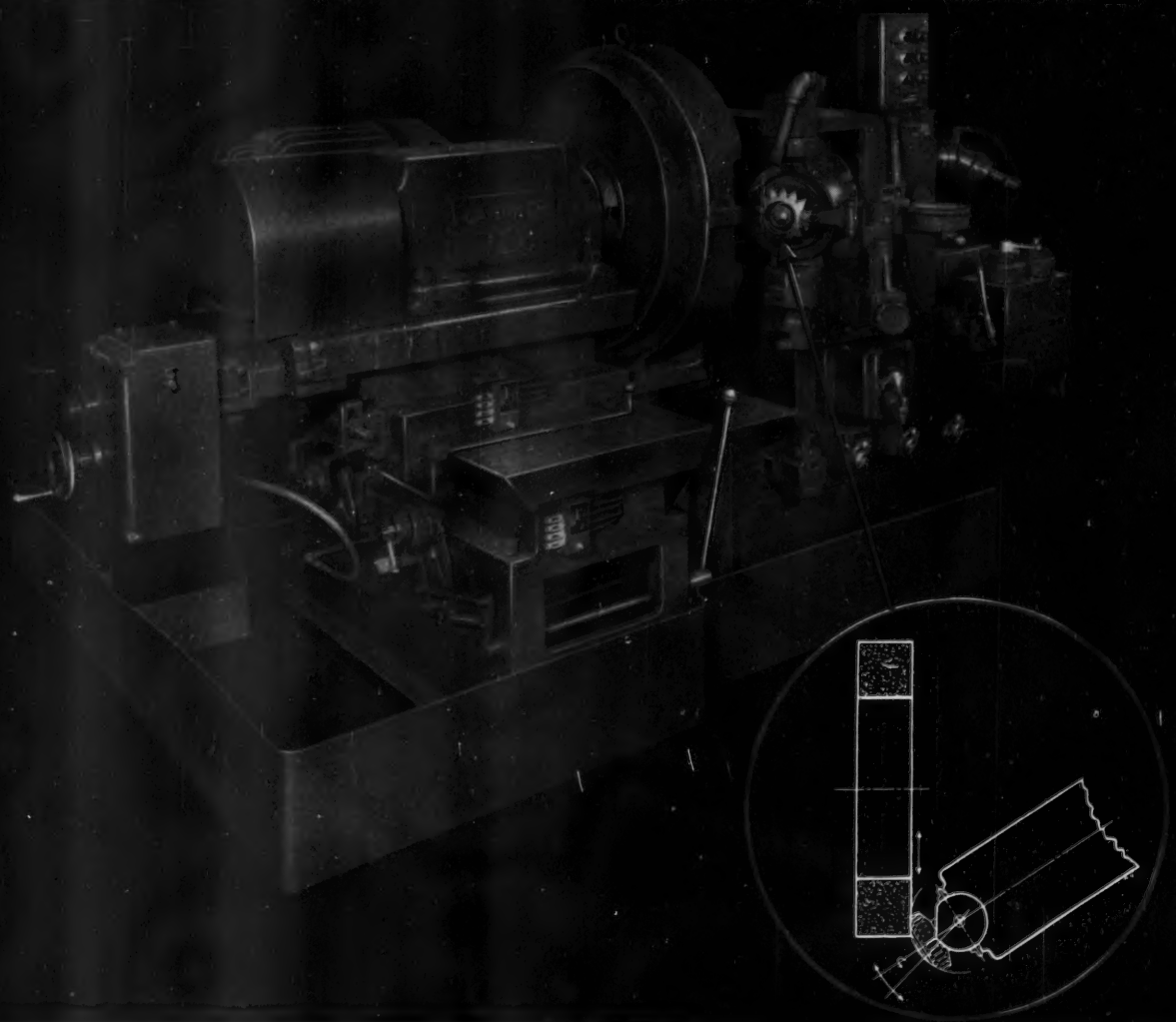
THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

NEW DISC GRINDING METHOD GENERATES CURVED SURFACE

Production of rock-bit side cutters speeded by Gardner tooling



130 M

JOB DATA	
MACHINE	Gardner 726-26" Single Spindle Grinder
TOOLING	Hydraulically oscillating work carrying fixture with hydraulic work clamping
ABRASIVE	26" x 3" x 16" disc—Gardner Wire-Lokt®
PRODUCTION	45 pieces per hour of spherical surface on rock-bit side cutter; formerly ground straight
TOLERANCE	.010" for uniformity
STOCK REMOVAL	Approximately 1/16" of hard surfaced steel stock

For assistance with any kind of surface grinding problem, send us blue prints for production estimates and tooling suggestions.

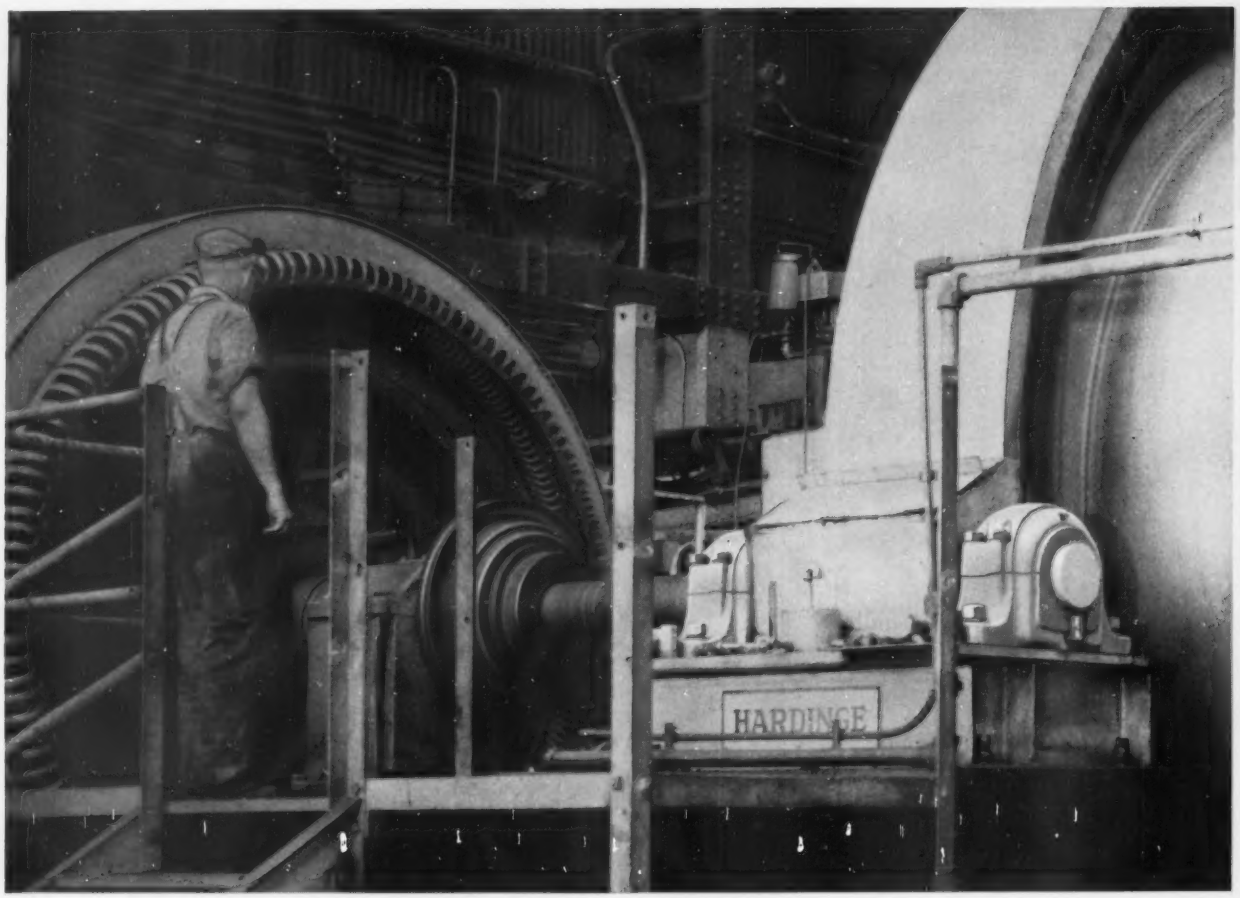
GARDNER MACHINE COMPANY

410 Gardner St., Beloit, Wisconsin, U.S.A.

GARDNER

precision disc **Grinders**

Bearing problem?



LINK-BELT ROLLER BEARINGS chosen for huge grinding mill

INSTALLATION of this Hardinge Tricone mill at Tennessee Copper Co. resulted in an important conservation of grinding energy. And to support the pinion shaft drives, Hardinge designers chose Link-Belt roller bearing pillow blocks.

Wherever friction must be minimized and power consumption reduced, you'll find Link-Belt bearings. Precision-built and positively sealed, they deliver long-life, free-rolling shaft support on the toughest jobs. That's why they're first choice of so many leading design engineers.

You'll find there's a Link-Belt ball or roller bearing for every industrial need. And there's a Link-Belt bearing engineer near you to help apply them to your particular requirements. Call him today, or write for your copy of Data Book 2550.

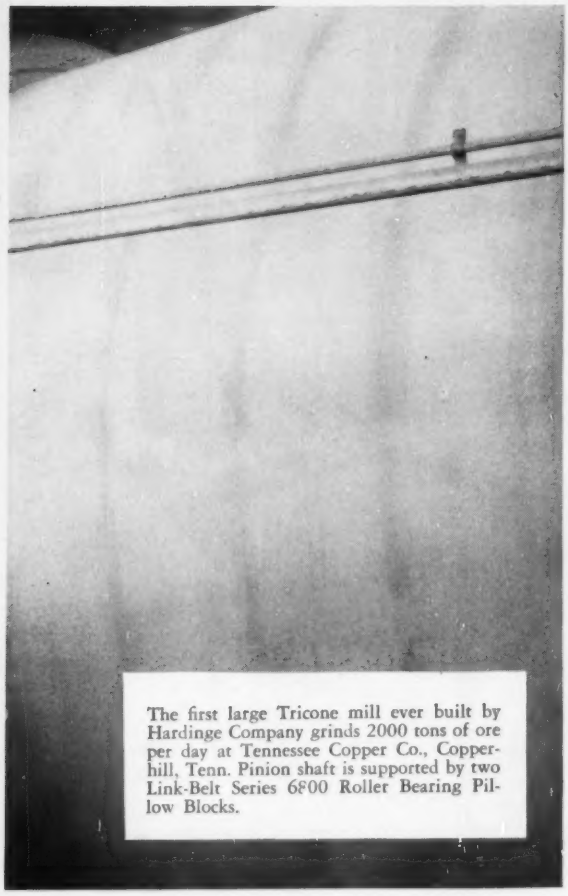
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices, Stock Carrying Factory Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.38 -BU

LINK-BELT

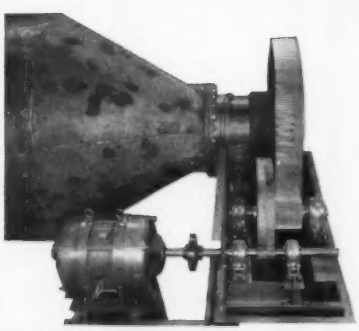
BALL AND ROLLER BEARINGS

LINK-BELT ball and roller

READY ANSWER!



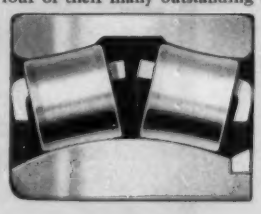
The first large Tricone mill ever built by Hardinge Company grinds 2000 tons of ore per day at Tennessee Copper Co., Copperhill, Tenn. Pinion shaft is supported by two Link-Belt Series 6800 Roller Bearing Pillow Blocks.



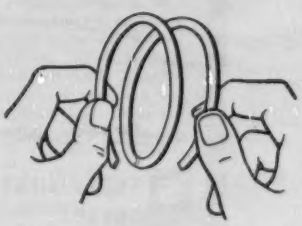
Hardinge also uses Link-Belt roller bearings on drive-shafts of many other grinding mills like this pebble mill.

FACTS: for bearing users

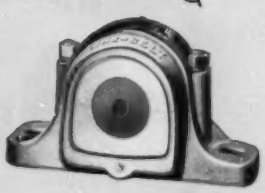
Series 6800 Roller Bearing Pillow Blocks — used on the Hardinge mills — are part of Link-Belt's line of pillow blocks, flanged, flanged cartridge, cartridge, take-up and hanger blocks and unmounted bearings. Following are just four of their many outstanding features:



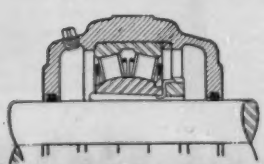
INTEGRAL SELF-ALIGNMENT. Concave rollers operate between convex raceways. Inner ring is true spherical element, free to turn in any direction without altering contact with rollers. Symmetrical rollers completely pocketed in retainers for accurate spacing and guiding. Long, care-free bearing performance is assured even with shaft deflection or misalignment.



SPIRAL STEEL SEALS provide effective lubricant retention for either oil or grease. Housing sealing fully protects all moving surfaces which are centrally lubricated from a large, common reservoir.



END PLATE can be used for protection where shaft terminates at the bearing. No added machining is necessary.

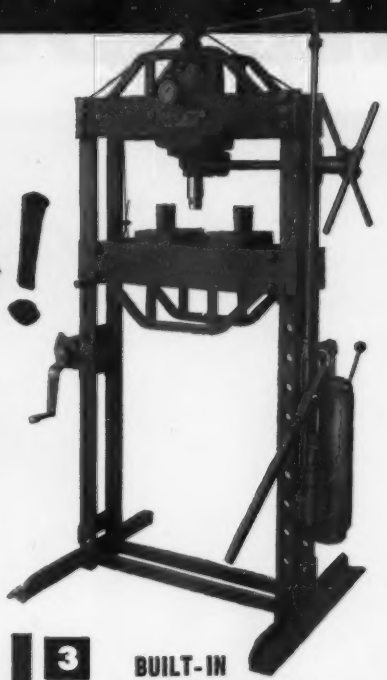


INCREASED COMPACTNESS is achieved with self-contained design. There are no external rotating parts to mar smooth appearance.

bearings keep company with America's hardest-working machines

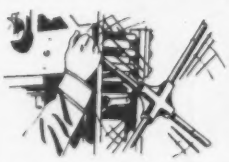
KRW is the Best Hydraulic Press You Can Buy!

Let's take one apart and prove it!



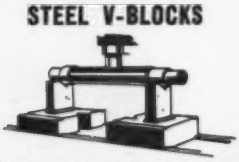
KRW Customers, which includes almost every nationally known company in the United States and Canada, tell us that KRW Presses are the best buy! They have proved it to themselves in day after day, year after year satisfactory performance. Now we want to prove to you why these customers are so right.

1 RAPID APPROACH OF RAM FILLS CYLINDER WITH OIL



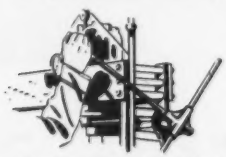
The ram is quickly brought down to the work by rotating the "Capstan" handwheel. As the ram descends to the work the cylinder is automatically filled with oil. A flip of the ball arm closes the valve, and the first pumping stroke gives tons of pressure on the work.

2 MACHINED ALL-STEEL V-BLOCKS



KRW all-steel V-blocks (furnished with the press) have machined shoulders which slide on the machined top surfaces of the bed members. This means you can slide the V-blocks along the bed to make quick setups and they're always in alignment. You get solid, rigid, accurate support. No danger of V-blocks tipping or falling between the bed members.

3 BUILT-IN MECHANICAL PRESS

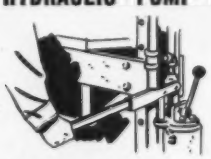


Spinning the "Capstan" handwheel rotates a pinion which engages a rack cut in the ram. The sliding handles in the handwheel can be extended to increase leverage to give a ram pressure of 3 tons. This "built-in" mechanical arbor press gives the operator the advantage of the large bed and its adjustability. It permits the use of the V-blocks when necessary. If more than 3 tons pressure is required close the valve and a few pumping strokes give the needed hydraulic pressure without moving the work from the bed.

4 WELDED TRUSS REINFORCEMENT

The heavy steel bed and crown plates on KRW presses have a special welded truss reinforcement to give them added strength and rigidity with minimum weight. This feature minimizes deflection.

5 CONVENIENT LOCATION OF HYDRAULIC PUMP HANDLE



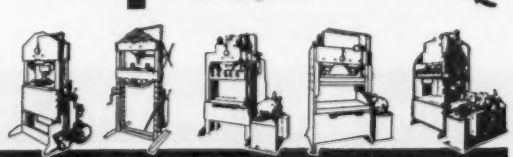
The KRW pump handle is slightly below waist level, a natural, comfortable position which enables the operator to work for long periods of time without fatigue. He can exert whatever strength necessary easily and efficiently. It's a man-saving feature that results in better, more accurate work and greater production.

COMPLETE LINE

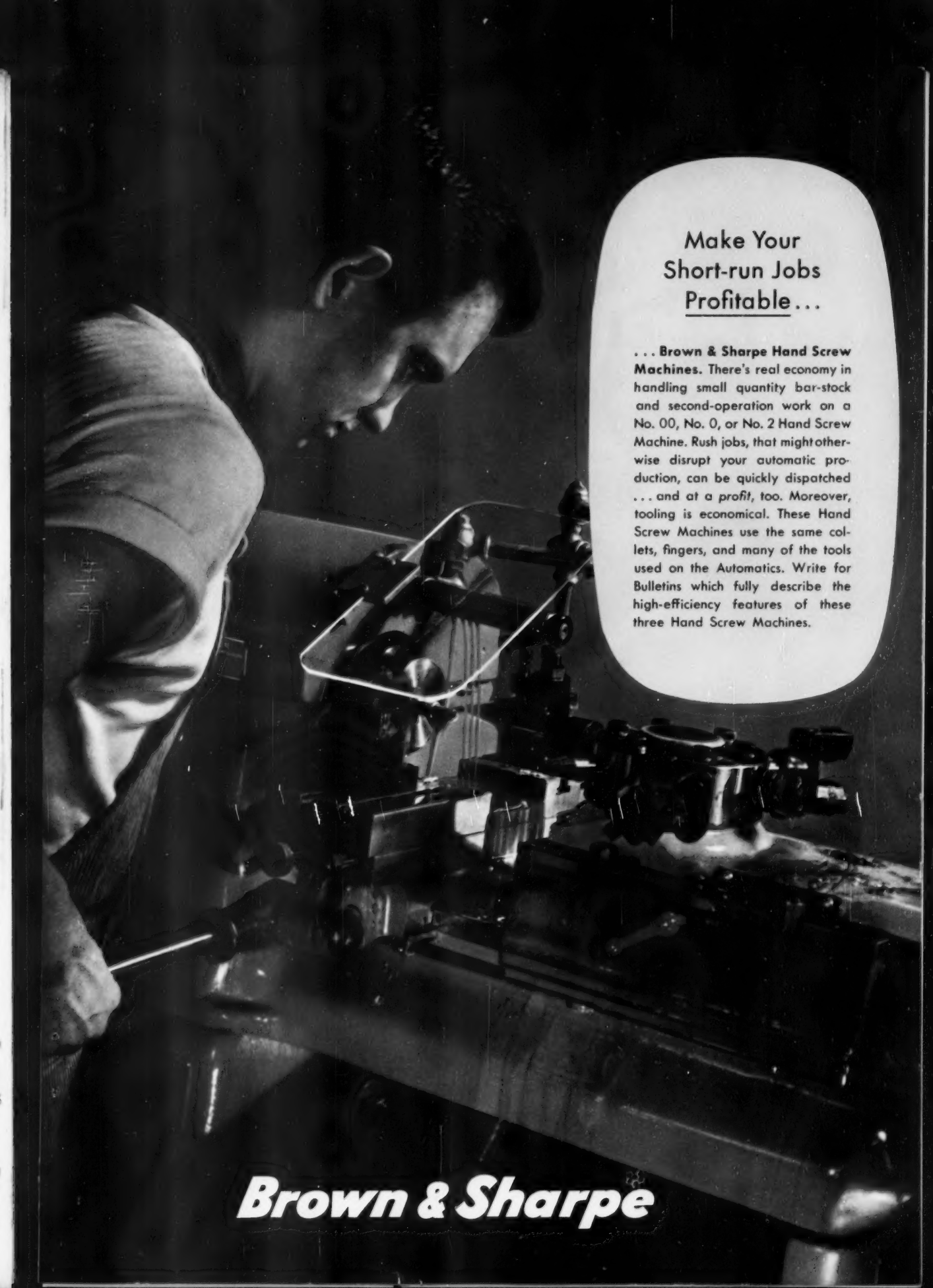
KRW makes a complete line of one, two and three cylinder Hydraulic presses, 25 to 150 ton capacities; hand operated, air operated or motor driven. Tell us your needs. We'll send you facts, specifications and prices without obligation.

K·R·WILSON

210 Main Street, Buffalo 3, N. Y.



Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!


Make Your
Short-run Jobs
Profitable...
. . . Brown & Sharpe Hand Screw Machines. There's real economy in handling small quantity bar-stock and second-operation work on a No. 00, No. 0, or No. 2 Hand Screw Machine. Rush jobs, that might otherwise disrupt your automatic production, can be quickly dispatched . . . and at a profit, too. Moreover, tooling is economical. These Hand Screw Machines use the same collets, fingers, and many of the tools used on the Automatics. Write for Bulletins which fully describe the high-efficiency features of these three Hand Screw Machines.
Brown & Sharpe

America's Only Micrometers
with Stainless Steel Spindle and Screw!
New Brown & Sharpe Micrometers give you complete protection from rust and stain—the common causes of excessive wear and loss of reading accuracy. Exclusive stainless steel, one-piece spindle and screw with hardened and ground threads is permanently rust-proof. Dull chrome frame and thimble resist acid perspiration and other causes of stain. Many other quality features, such as carbide measuring faces, give these new micrometers long lasting accuracy—make them easier to use. Write for Catalog 35M and read all about the hundreds of precision hand tools made by Brown & Sharpe.
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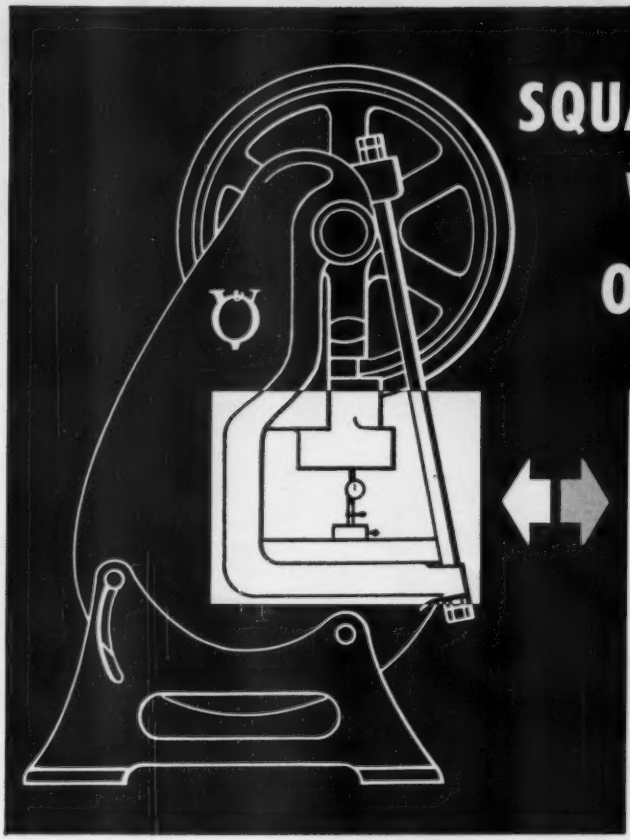
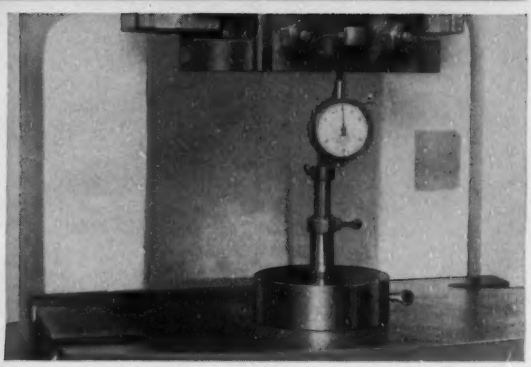
SQUARE AND PARALLEL WITHIN .0005" ON A 4" STROKE





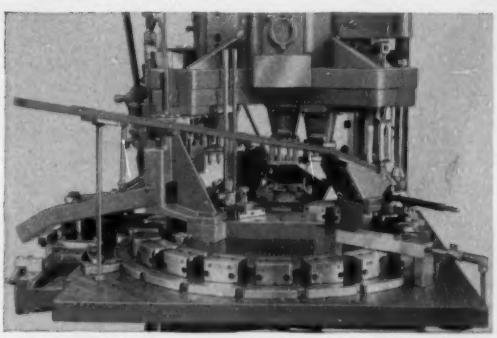
The dial indicator gage may not show a variance greater than .0005" when measuring any opposed points on these two surfaces. The same indicator is used with a ground steel square to check slide travel both F-B and R-L.

That sounds like a machine tool specification, doesn't it? Actually, it is a standard specification for a V & O long slide press: the press that is built like a high grade machine tool. We make special presses to even closer specs.

Operating precision of that order is very important if you want to use carbide dies, or fabricate thin materials, or do deep drawing, or work to high precision. You can do more, and do it better, when your press is highly accurate.

From our viewpoint, since we are going to use long slides we might as well build the rest of the press with accuracy to match. Otherwise, the precision of the long slide would be wasted. So we make extremely accurate ways and use them as reference surfaces with which all the tool carrying parts of the press must line up. And that gives you a press that will do a lot more for you.

Our representative would like to tell you more about the press that is built like a high grade machine tool. Write us, please.



Without high precision relationships between the tool-bearing surfaces and the slide travel of the press the maintenance costs of tooling of this complexity would be prohibitive.

Only the best is good enough

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

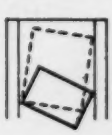
BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

65th Anniversary

★ ***STOP AND SAY HELLO AT ASTE SHOW-BOOTH 1056***

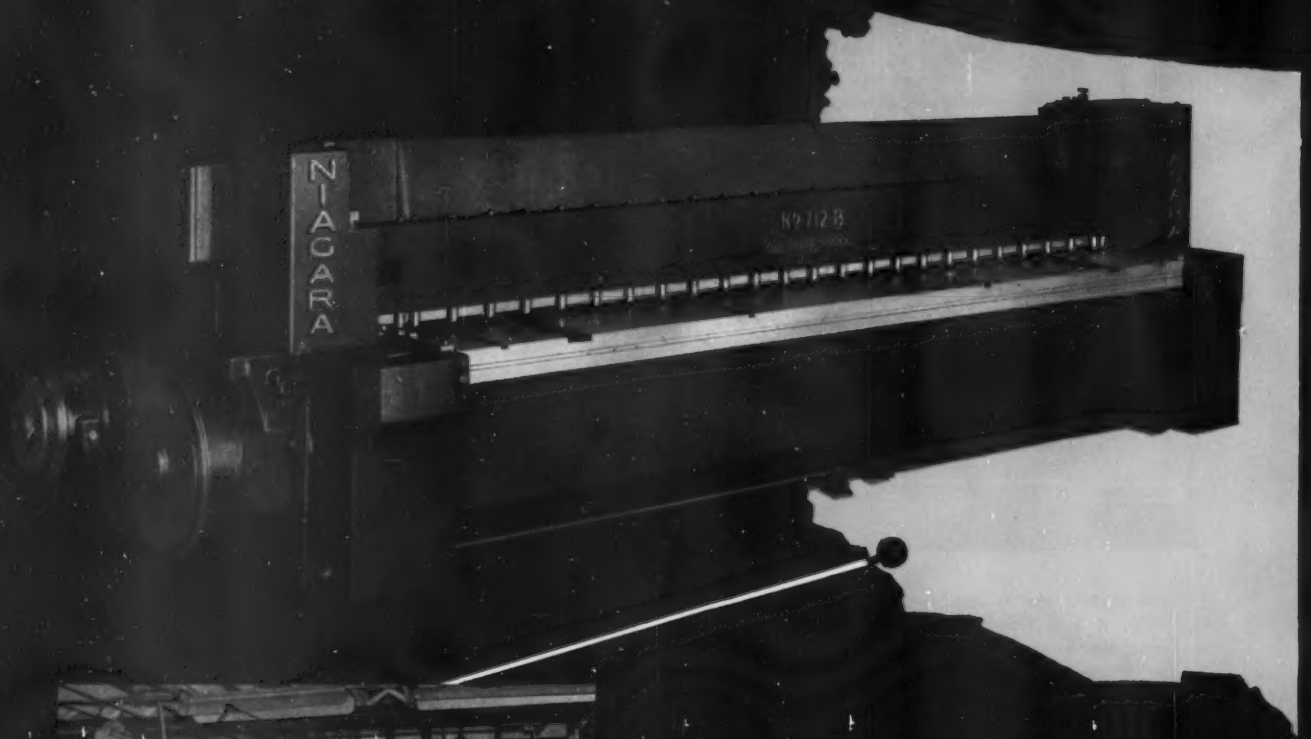
WHY THE V&O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.

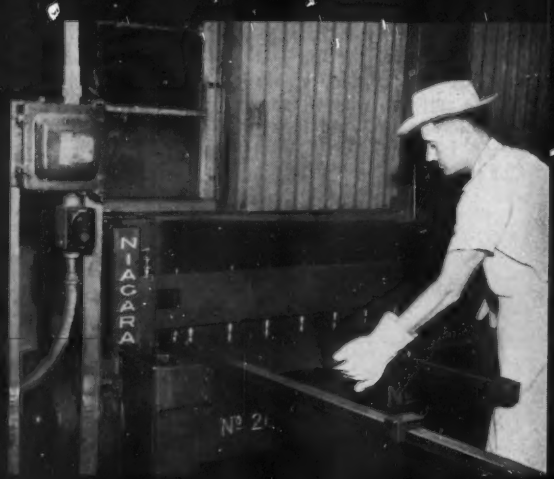


NIAGARA

SERVE INDUSTRY FROM



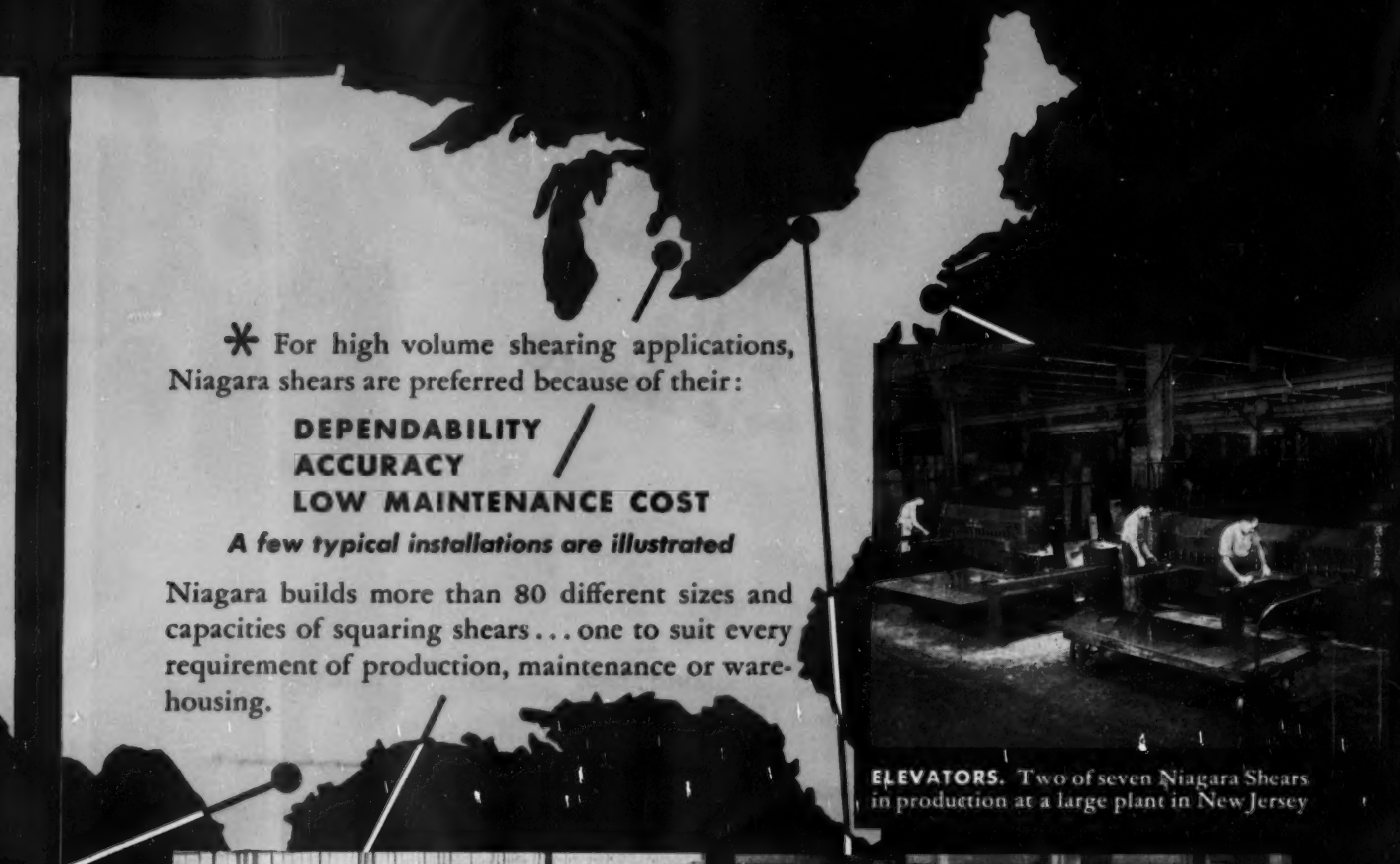
ELECTRONICS. Cutting .003" molybdenum to within .001" and ¼" copper with no change in set-up at a plant in California



DRUMS. Shearing sheets for drum bodies in Texas

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.

SHEARS
COAST TO COAST



✱ For high volume shearing applications, Niagara shears are preferred because of their:

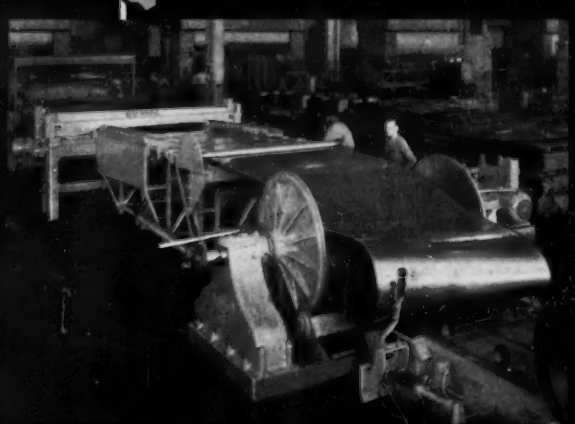
DEPENDABILITY
ACCURACY
LOW MAINTENANCE COST

A few typical installations are illustrated

Niagara builds more than 80 different sizes and capacities of squaring shears . . . one to suit every requirement of production, maintenance or warehousing.

ELEVATORS. Two of seven Niagara Shears in production at a large plant in New Jersey

WAREHOUSE. Shearing thousands of tons of all kinds of steel at a steel warehouse in Michigan



AUTOMOBILES. Continuous operation in a cut off line at a body plant in Western New York

America's Most Complete Line of Presses, Shears, Machines and Tools for Sheet Metal Work

DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA

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CINCINNATI accurately

1/2" plate and 20 gauge sheets

...without changing knife clearance

. . . You do not change knife clearance for successful shearing of different thicknesses on a Cincinnati. Just set the clearance for the thinnest material and shear all thicknesses up to capacity. Thousands of Cincinnati Shears are used continuously in this manner. This practical method prevents accidental damage — saves time. Remember, changing knife clearance interrupts production.

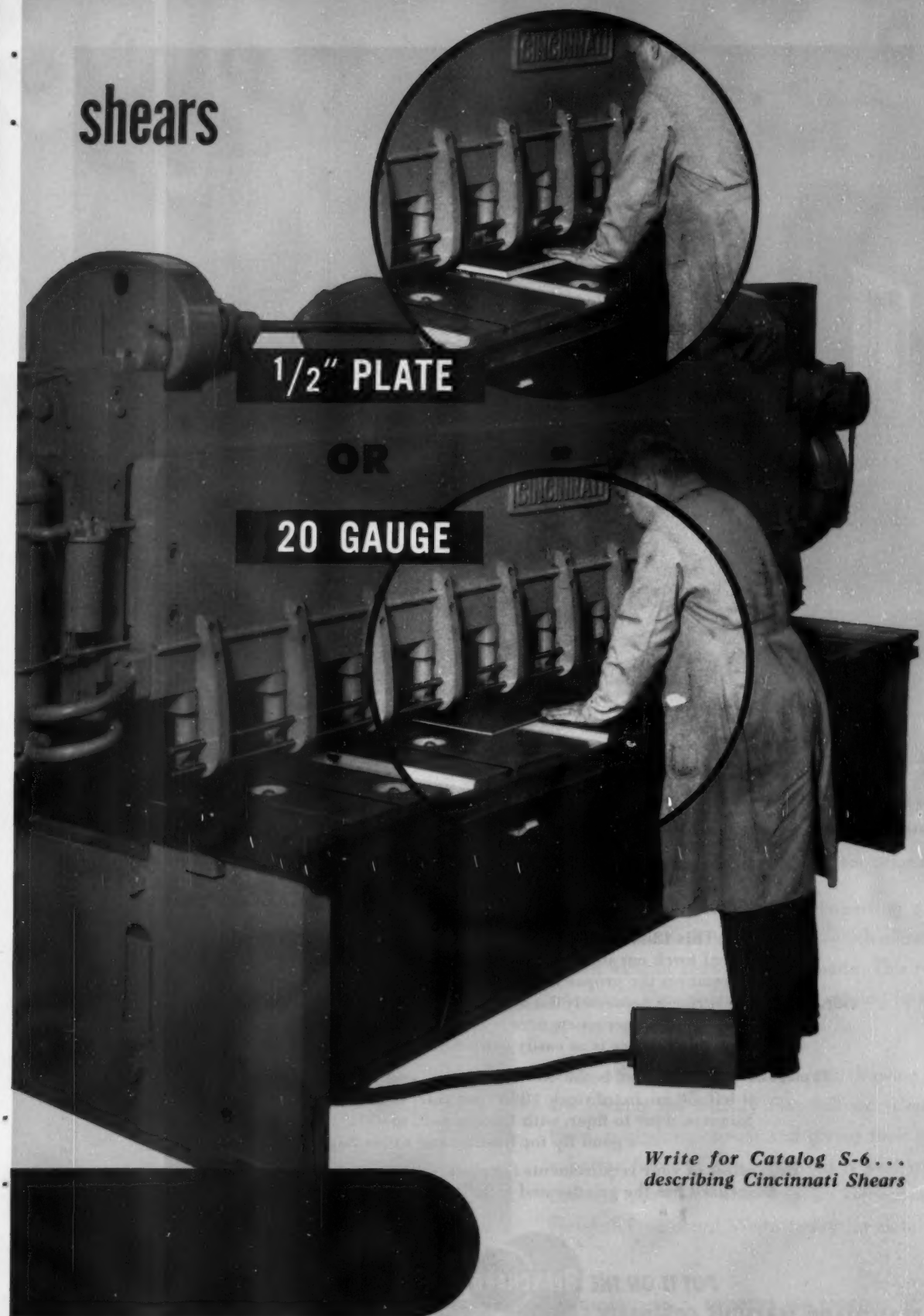
Sharp knives are a necessity for satisfactory shearing, especially on very light gauges. Remember, changing knife clearance does not sharpen dull knives. We suggest you write for data sheet on knife life.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

shears



Write for Catalog S-6 . . .
describing Cincinnati Shears

Takes on all comers!

This 42-72-84 Blanchard Surface Grinder is used for machining many sizes of torch cut steel plates. As the first operation after cutting, Blanchard grinding removes the proper depth of stock as required, frequently up to ⅛" per side, producing surfaces accurately flat and parallel for laying out or further machining. Work up to 7 feet across corners is regularly ground on this machine. In spite of its size, this grinder is as easily controlled as the smaller Blanchard grinders.

Typical of work produced is the 48" x 48" x 10" machine steel, die mounting plate, at left. 58 cu. in. of stock (.025" per side) is ground off in one hour and 35 minutes, floor to floor, with flatness held to .001". Note the magnetic hoist —a good tip for loading and unloading the Blanchard quickly.

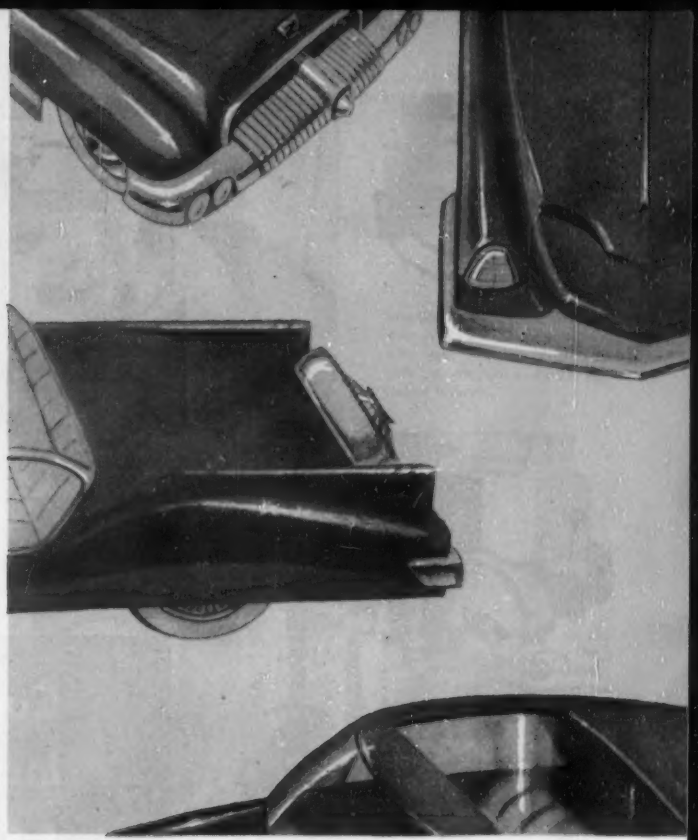
Regardless of your requirements for stock removal, tolerances or surface finish, Blanchard has the grinder and grinding wheel to do each job best.

Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

PUT IT ON THE **BLANCHARD**

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



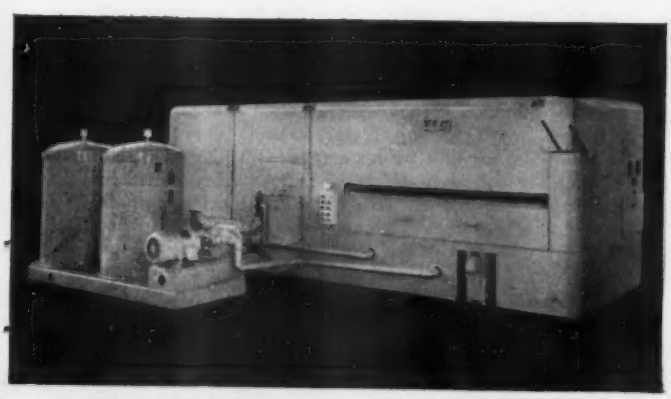
To Look their Best

AUTOMOBILES, Too Require A Beauty Treatment

The Beauty Salon takes care of the lady. The McKay Flex-Roll Processor takes care of the automobile. More than 90 percent of all the steel used in modern motor car bodies, doors and fenders is run through a McKay Flex-Roll Processor prior to drawing.

The Flex-Roll works the steel, imparting a uniform condition throughout the sheet, which allows it to be drawn without showing strain marks. This results in a smoother, blemish-free surface, adding to the beauty of the new car finish.

Many other industries, where deep drawing is required, are finding the McKay Flex-Roll works as well for them, minimizing rejects and giving their products a better finish. If deep drawing is part of your business you can't afford to be without a McKay Flex-Roll Processor. Write today for details.



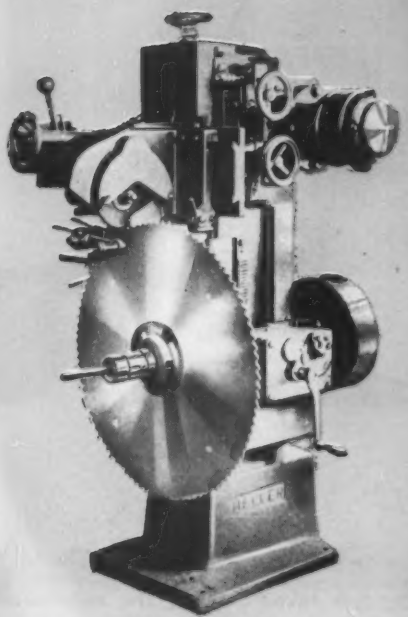
The McKay Flex-Roll Processor

The McKAY MACHINE Company
YOUNGSTOWN, OHIO

McK

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

MODEL SSH-800-A
AUTOMATIC COLD METAL
SAWING MACHINE

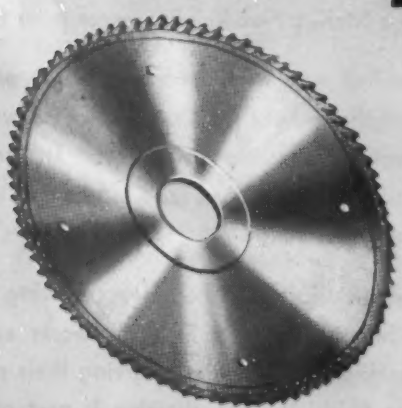


MODEL B-650
AUTOMATIC SAW SHARPENING
MACHINE

Cutting Costs and
Increasing Efficiency with

HELLER

COLD SAWING MACHINES
BLADE SHARPENING MACHINES
AND SAW BLADES



HELLER GIVES YOU COMPLETE SERVICE WITH
EXACTLY CORRECT BLADES.

Heller High Efficiency Cold Metal Sawing Machines are built in both manual and fully automatic types in machine sizes ranging from 3" bar capacity up to 48" billet capacity and blade sizes from 12" to 120" diameter. They are full hydraulic with completely centralized operating control. Illustration shows our SSH-800-A full automatic with bar capacity to 10" round stock.

The Model B-650 machine shown represents a new construction in arrangement and operating features. Using change gears and built-in dividing head, it insures a true tooth pitch and form and eliminates the use of a variety of master index plates for varying diameters and pitches of saw blades. Machine is rigidly constructed to secure extremely high grinding capacity and performance and produces a true and correct cutting tooth shape. Machines built in five sizes for 2½" to 120" diameter saw blades.

Importing Heller Machines Since 1926

HELLER MACHINE COMPANY, 114 Liberty St., New York 6, N. Y.

KNEE AND PLANER TYPE MILLING MACHINES • RADIAL AND COLUMN DRILLING MACHINES • TRANSFER MACHINES • SPECIAL MACHINES

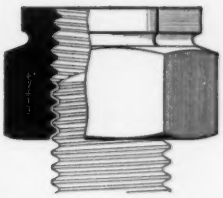
More and more automotive repair shops and industrial plants are turning to FLEXLOCs to reduce maintenance on high speed, vibrating equipment.

FLEXLOC locknuts save $600 per year in reconditioning automobile engines

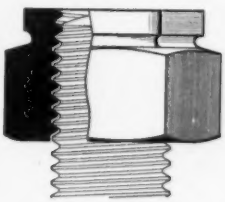
By using FLEXLOCs on connecting rod bolts, a motor reconditioning shop cut assembly time by a minimum of 5 minutes per motor. This added up to a yearly saving of 250 hours or $600. No drilling of bolts was needed . . . no adjusting of nuts to set cotter pins was required. And the FLEXLOCs assured a tighter assembly than was possible with the castellated nuts and cotter pins formerly used.

FLEXLOC locknuts reduce maintenance too. Once they are installed, you can forget them. Service and inspection periods can be stretched safely from days to weeks. And FLEXLOCs are reusable. They can be applied again and again without losing locking efficiency.

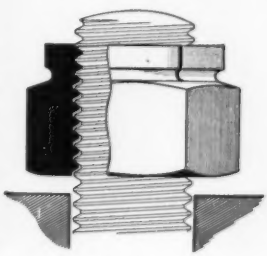
You can get FLEXLOC Self-Locking Nuts of various types and materials in a wide range of sizes and in any quantity. These one-piece, all-metal nuts are carried in stock by leading industrial distributors everywhere. Write for literature and samples for test purposes. STANDARD PRESSED STEEL Co., Jenkintown 1, Pa.



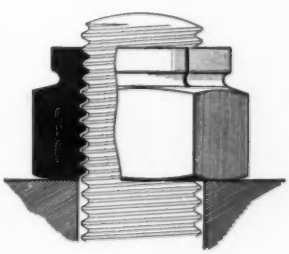
Starting. A FLEXLOC starts like any ordinary nut. Put it on with your fingers. Tighten it with a standard hand or speed wrench.



Beginning to Lock. As the bolt enters the segmented locking section, the section is expanded, and the nut starts to lock.



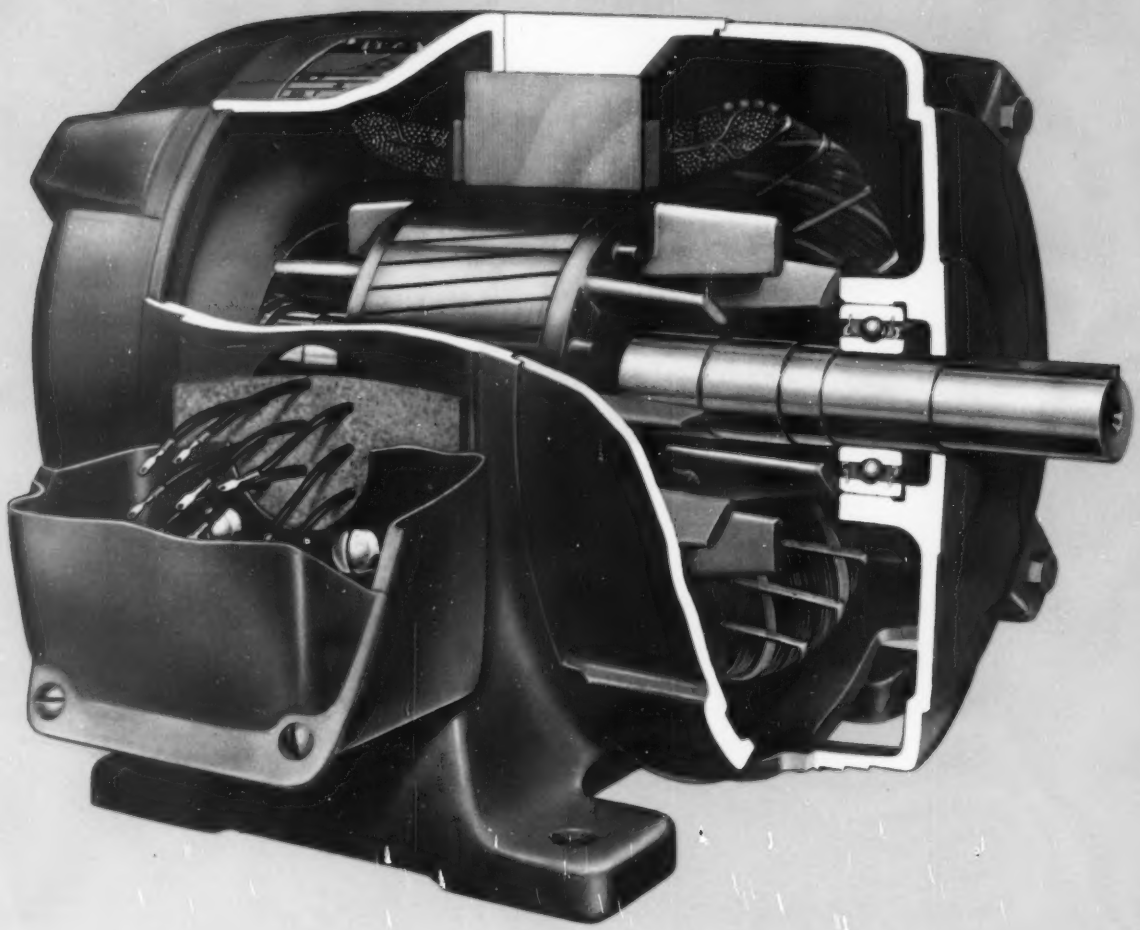
Fully Locked As a Stop Nut. When 1½ threads of a standard bolt are past the top of the nut, the FLEXLOC is fully locked. A FLEXLOC does not have to seat to lock.



Fully Locked As a Seated Nut. When it is used as a lock or stop nut, the locking threads of the FLEXLOC press inward against the bolt, lifting the nut upward and causing the remaining threads to bear against the lower surface of the bolt threads. Vibration will not loosen a FLEXLOC, yet there is no galling of threads.

FLEXLOC® LOCKNUT DIVISION

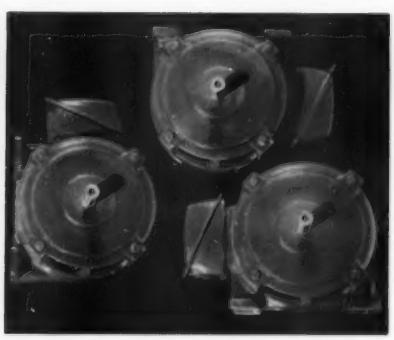
SPS
JENKINTOWN PENNSYLVANIA



New 4-WAY SEAL, pre-lubricated bearing means lower maintenance costs. Another step ahead in bearing design. A SEALED, PRE-LUBRICATED bearing with *two* protective seals on *each side*. Stationary inner seals form labyrinth joints. Rotating outer seals act as flingers. This bearing has all the advantages of the original Life-Line sealed bearing—*plus extra protection.*

New FORTIFIED INSULATION means longer motor life. Another step ahead in motor insulation. MYLAR*, a new slot insulation with greater dielectric and mechanical strength. BONDAR, a new wire insulation with more heat resistance . . . longer life. BONDITE, a new stator insulation with greater strength to withstand attacks from destructive elements.

*Trademark for DuPont polyester film



New PROTECTED HOUSING means dripproof in any position. Another step ahead in motor protection. End-bracket openings are located in the under-quadrant for maximum protection. Brackets can be rotated 90° or 180° for wall or ceiling mounting. Circumference of motor frame is *completely enclosed* so that it remains dripproof in *all* mounting positions.

The new Life-Line A motor ...the big step ahead by Westinghouse

Here it is . . . the new Life-Line® "A" motor. A new motor that steps ahead to lead the industry. A new motor that reflects the continuing engineering and manufacturing leadership of Westinghouse. A new motor that gives you . . .

Greater protection
Greater application flexibility
Smoother, quieter operation
Lower maintenance costs
Fewer motor outages
Longer motor life

The new Life-Line "A" motor is still a step ahead of the industry. How? Through balanced design and proved performance. Look at the improved materials and advanced mechanical and electrical components—each one matched to its neighbor.

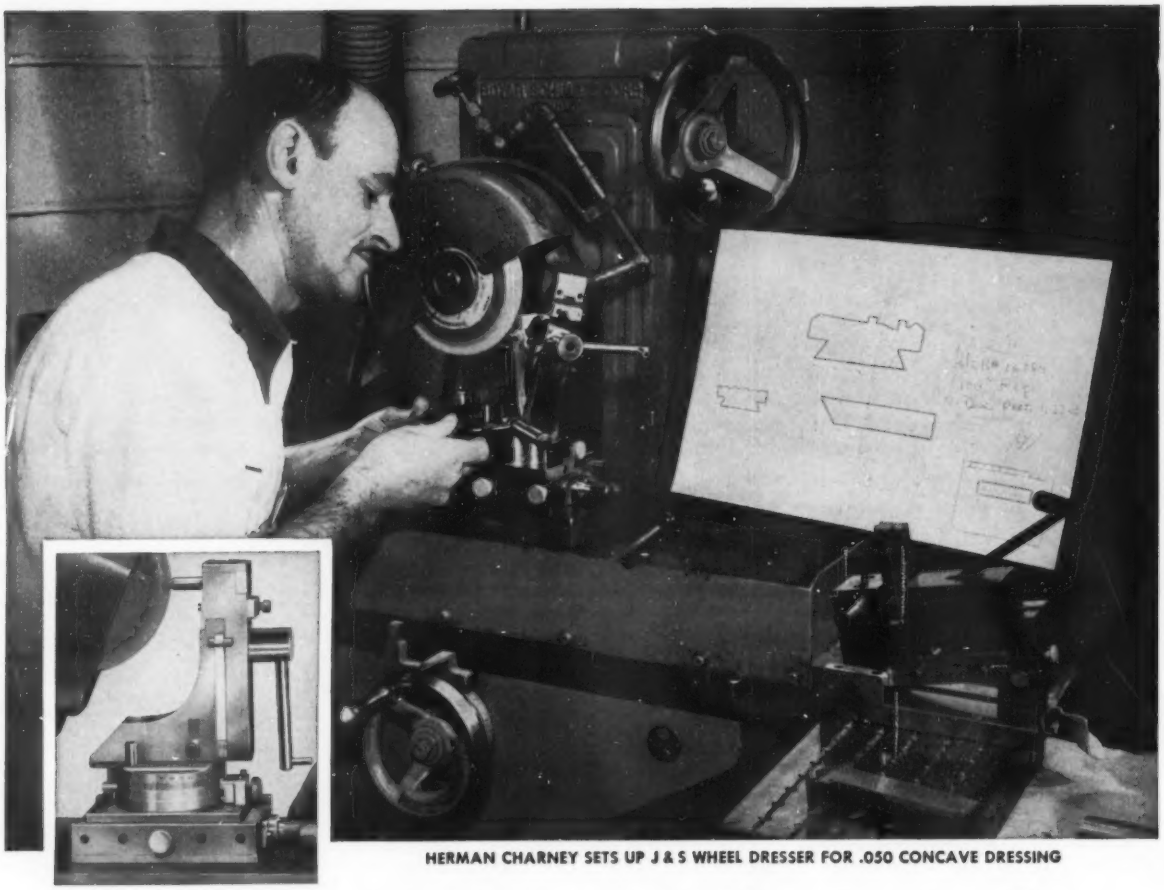
New? Yes, but not untried. The new Life-Line does not discard the past . . . instead it profits by it and builds upon it. Each component of the new Life-Line has been screened in the laboratory, then proved on production-line motors. You're not buying "theoretical" performance. The new Life-Line motor, is a proved Life-Line.

J-21846

GET THIS FREE BOOK

Here are all details on the new Life-Line "A" motor. Read about the new insulating materials—the new stator core—the new cooling methods—the new precision manufacturing techniques. Write for your free copy of Booklet B-6154. Westinghouse Electric Corporation, 3 Gateway Center, P.O. Box 868, Pittsburgh 30, Penna.

YOU CAN BE SURE...IF IT'S Westinghouse



HERMAN CHARNEY SETS UP J & S WHEEL DRESSER FOR .050 CONCAVE DRESSING

Saves hours by setting angles in seconds, radii in minutes

A typical job made easier with a J & S "Fluidmotion" Wheel Dresser

Here's a wheel dressing job which calls for 13 angles, 4 radii, 7 flats. Ordinarily you might expect to spend from 5 to 30 minutes for each setting. With a J & S "Fluidmotion" Wheel Dresser, tool grinder Herman Charney made *all* 24 settings in just 21 minutes.

Time-saving Features

An unusual case? No — it's typical of the speed and ease of operating a J & S Wheel Dresser. Setting 2 angles with a "Fluidmotion" Dresser, for example, takes only 10 seconds. Setting a radius takes only 2-3 minutes.

Note just *how* easy it is to operate a J & S Wheel Dresser. All you need is a micrometer and a simple hex wrench. You can forget about gage blocks, height gages and master gage settings. No need to bother either with parallel bars, surface plates or dial indicators.

With the "Fluidmotion" Dresser, you can also dress two angles tangent to a radius in one continuous motion. After dressing the angles, the diamond automatically returns to center.

Accurate to 0.0001"

Accuracy? You can make concave and convex contours at a full 180 degrees with a guaranteed accuracy of 0.0001". J & S dressed forms, too, are always clean and precise. Angles and radii *flow* into each other, free of tool or chatter marks.

These are some of the benefits you get when you use a J & S "Fluidmotion" Wheel Dresser. A variety of models are available for dressing wheels up to 24" in diameter. Construction in all cases is of high-carbon, high-chrome steels.

Write for complete information today.

J&S TOOL CO., INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS • DOWN-HOLDING DEVICES

646 W. MT. PLEASANT AVENUE, LIVINGSTON, NEW JERSEY

UNION

Ever since the 17th century, for beauty of tone, form and craftsmanship, the violins of Antonio Stradivari have stood out as masterpieces.

Among all modern cutting tools, those produced by Union are outstanding in their uniform quality, precision and long life.

The "HALIR" violin from the collection of Frederick S. Haenel, Gaylordsville, Conn.

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Three & Four Groove
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UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

End Mills Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

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J & L DIE HEADS OFFER *everything!*

- ✔ LOW INITIAL COST
- ✔ EASE OF OPERATION
- ✔ CONTROLLED RESHARPENING
- ✔ CLASS III GUARANTEED
- ✔ USE OF CARBIDE TIPPED CHASERS WHERE APPLICABLE

FOR BROWN & SHARPE AUTOMATICS and SMALL TURRET LATHES
Capacities from #0 to 1¼"

RADIAL CHASER TYPE
Capacities from #8 to 4¼"

TANGENT CHASER TYPES
Stationary and Revolving
Capacities from #4 to 2"

Visit the J&L Booth No. 1509 at the ASTE Show.

Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.

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Machine Tool Craftsmen Since 1835

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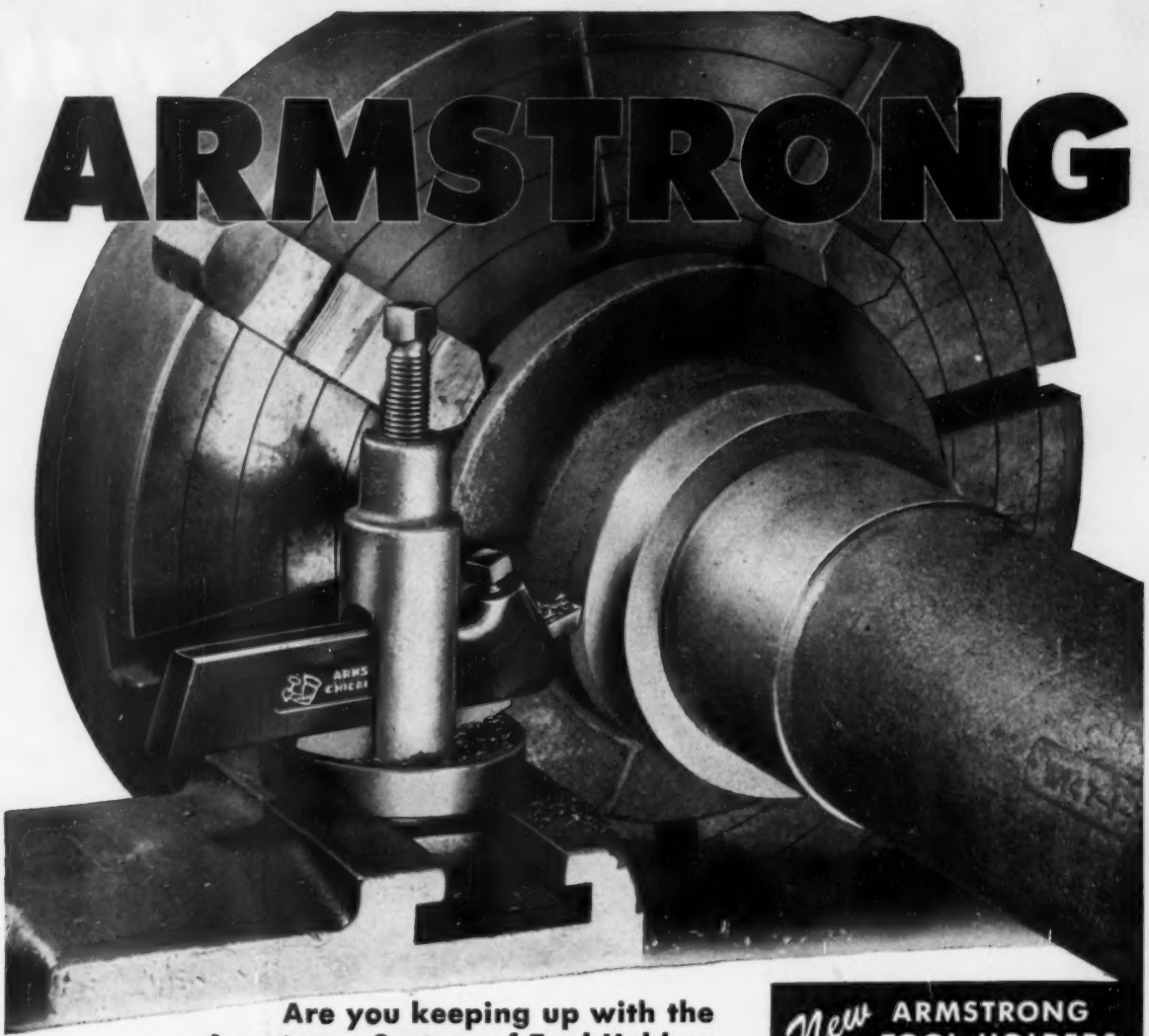
J&L THREAD TOOL DIV.

ARMSTRONG



Are you keeping up with the Armstrong System of Tool Holders

Doubtless you are daily using ARMSTRONG TOOL HOLDERS that have been in continuous operation for many years. This is sound practice, for this means added profits without added tool costs. But to become complacent, so satisfied that you forget your ARMSTRONG TOOL HOLDERS, is unwise. The "Armstrong System" is a growing thing, with new types and sizes of ARMSTRONG TOOL HOLDERS constantly being developed to more effectively meet new machining conditions, or to take advantage of newly developed cutting materials.

With modern ARMSTRONG TOOL HOLDERS for each operation, you can greatly increase speeds and feeds. You can lower machining cost and further increase profits.

If you haven't kept up with the "Armstrong System" write for an ARMSTRONG Catalog and check to see that you are using the most efficient ARMSTRONG TOOL HOLDER for each operation on all lathes, planers, slotters and shapers.

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ARMSTRONG Spring Form Threading Tool Holder
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. . . as good

Newton M-59 Duplex Unit-Head Milling Machine with hydraulic spindle retraction and clamping that *accomplish stock removal and high quality finish in one pass!*

CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-

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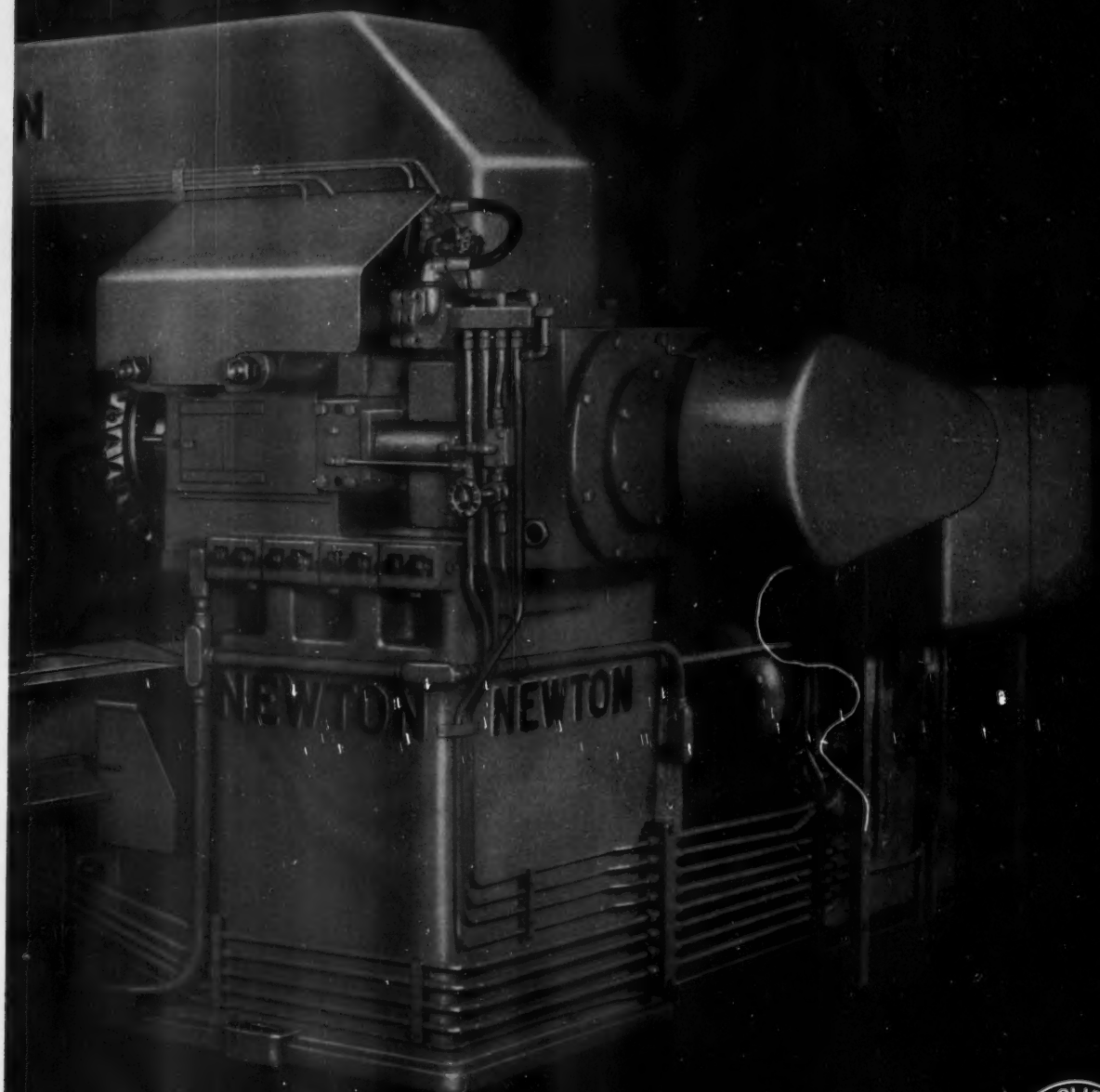

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Birmingham Company, Incorporated

HARDINGE
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Simply TURN KNOB FOR EXACT FEED REQUIRED

CHANGE FEEDS WITHOUT STOPPING SPINDLE OR CHANGING OR SHIFTING GEARS

COARSE FEED | MEDIUM FEED | FINE FEFD

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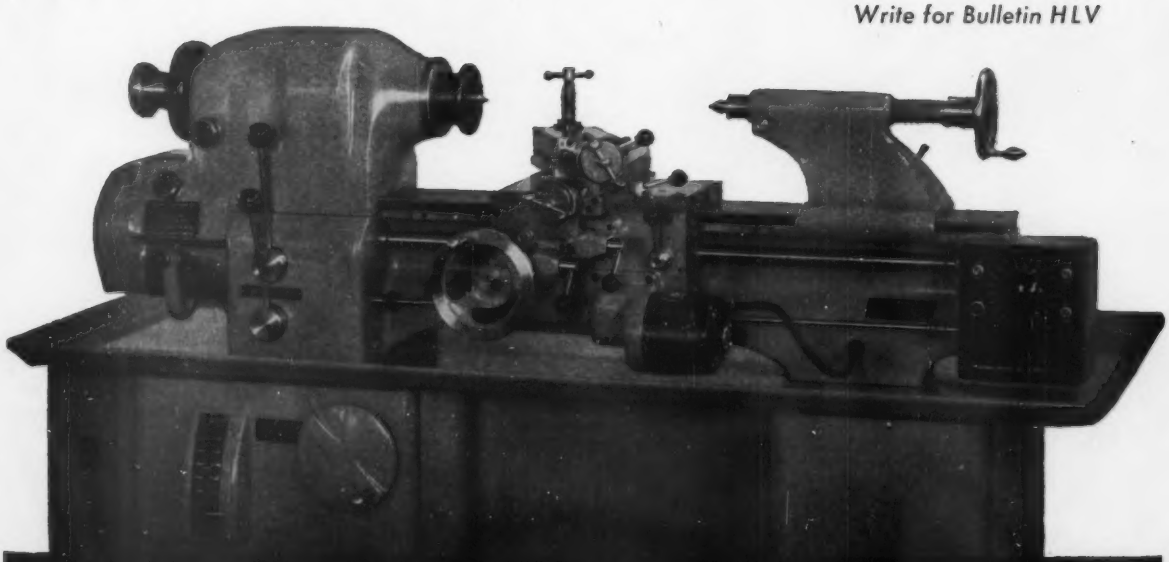

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Years of successful experience in special tooling and related production problems are yours for the asking. When the job requires special cutting tools call in your National Tool Co. representative. He is backed by more than 49 years experience in the engineering and manufacture of special cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

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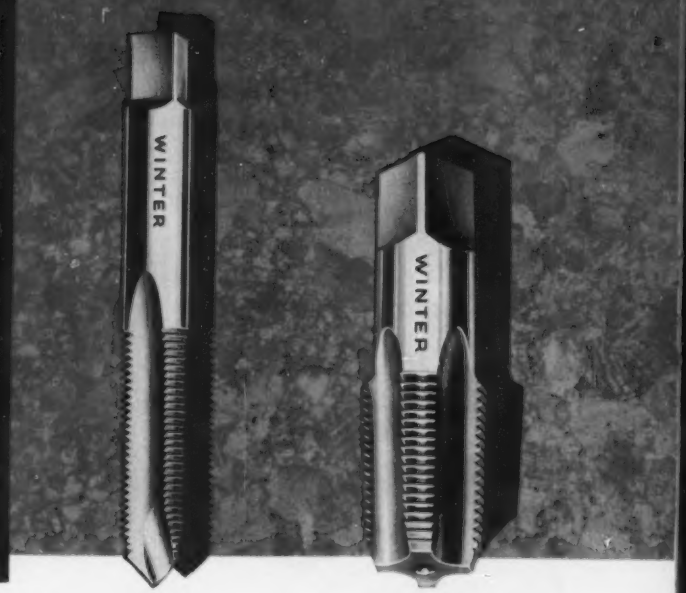
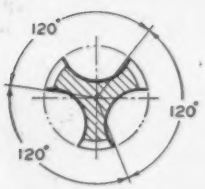
BALANCED Action

CAN YOU AFFORD TO USE TAPS THAT DO NOT HAVE IT?

When you consider the many cost-elements that go into production, you'll agree: "It's penny-wise and pound-foolish to compromise with the *quality of the tool.*"

Specify taps with Balanced Action—an inbuilt feature of the Winter line, exclusively—for accuracy and long life.

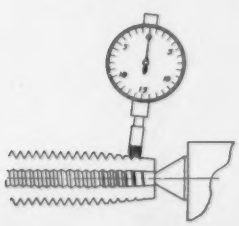




Exact Flute Spacing

Uniform Flute Contours

Precision Chip Driver Contours



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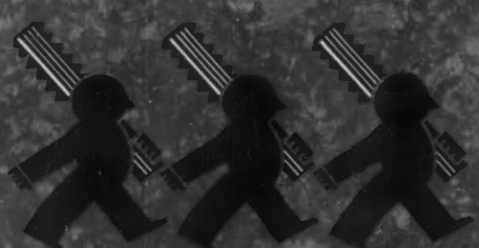
ALWAYS AT YOUR SERVICE

Your local Industrial Supply Distributor carries a complete stock of WINTER Taps



WINTER

WINTER BROTHERS COMPANY

Rochester, Michigan, U.S.A. Distributors in principal cities. Branches in New York, Detroit, Chicago, Dallas, San Francisco. Division of National Twist Drill & Tool Co.

FOR SMOOTH, ACCURATE HOLES —AND LOTS OF THEM!

National Reamers are ground to very close limits, with National's fine cutting edges. Lands and flutes are carefully proportioned. Materials and heat treatment are the finest . . . Result: *smooth, accurate holes*—and many, many of them!

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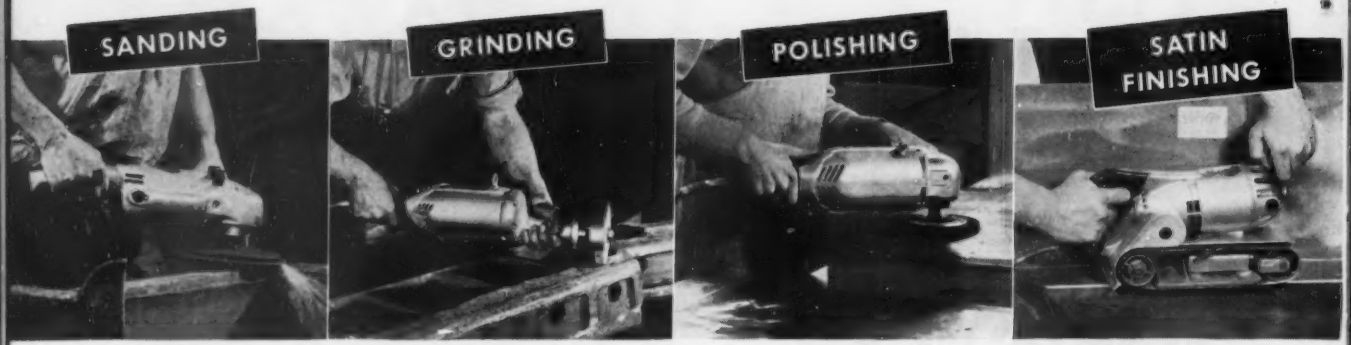
CALL YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

. . . for all your staple industrial needs, including NATIONAL Twist Drills, Reamers, Counterbores, Milling Cutters, End Mills, Hobs, and Special Tools

Do you have these jobs in your plant?



Only "SKIL has the answer"

to eliminate all your metal finishing "bottlenecks"

Only SKIL has 27 time and money-saving metal finishing tools to solve your most expensive, most troublesome production problems

SKIL Disc Sanders | SKIL Hand Grinders | SKIL Belt Sanders | SKIL Bench Grinder | SKIL Portable Grinder

IN PLANT AFTER PLANT... SKIL DOES IT FOR OTHERS...

"SKIL Disc Sanders knock weld beads down fast"

—says Adam Welch at the Luis Hoffman Company, Milwaukee, Wisconsin. "With a SKIL Disc Sander we can get the job done in shorter time and with less work," says Mr. Welch. "These disc sanders have power to smooth seams, remove weld marks, clean and grind . . . and the weight is light and balanced for easier handling."

"We've increased production 80% with two SKIL Belt Sanders"

—says the Service Manager of a western safe manufacturer. "Much of our work is refinishing of safes, safety deposit boxes, vaults, etc.," continues this factory executive. "We tried many sanders. All of them scratched and marred surfaces until we tried SKIL. On a recent order two men with two SKIL Sanders refinished 210 safes in less than two weeks for an 80% production increase. We saved $800 on labor alone!"

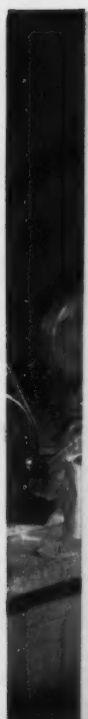
"3-year comparison tests prove SKIL Grinders best"

—says Mr. Lou Grundon, president Little Giant Crane & Shovel, Inc., Des Moines, Iowa. Mr. Grundon knows how to get the most out of tools. He has orders for his Little Giant Cranes and Shovels from as far away as Serbia, Venezuela and Arabia.

"We've used 6 SKIL Grinders for 3 years in direct competition with other brands," Mr. Grundon says, "and as a result, we plan to stick to SKIL tools in the future."

SEE HOW ONLY SKIL HAS ALL THE TOOLS TO DO EVERY METAL FINISHING JOB

Manufacturer	Disc Sanders	Spindle Grinders	Electric Hand Grinders	Pneumatic Hand Grinders	Belt Sanders	Oscillating Sanders	Bench Grinders	TOTAL
SKIL	6 Models	4 Models	3 Models	3 Models	5 Models	1 Model	5 Models	27
"A"	4 Models	3 Models	1 Model	—	—	—	3 Models	11
"B"	4 Models	3 Models	—	2 Models	2 Models	—	5 Models	16
"C"	4 Models	2 Models	—	—	—	—	4 Models	10
"D"	2 Models	—	—	1 Model	1 Model	—	2 Models	6
"E"	—	—	—	—	4 Models	2 Models	4 Models	10
"F"	2 Models	3 Models	—	—	—	—	4 Models	9



LET SKIL DO IT FOR YOU!

For Example: How many steps per day do your men waste carrying tools or work to a distant bench grinder? Steps that mean lost time, lost production dollars? Break *this* "bottleneck" with the *new* SKIL 6" Bench Grinders by spotting several of them around your shop in strategic locations.

SEND COUPON. LET YOUR SKIL DISTRIBUTOR PROVE TO YOU—WITH AN AMAZING DEMONSTRATION AND A FREE TRIAL—THAT "SKIL HAS THE ANSWER" TO YOUR PRODUCTION "BOTTLENECK"

SKIL PORTABLE TOOLS

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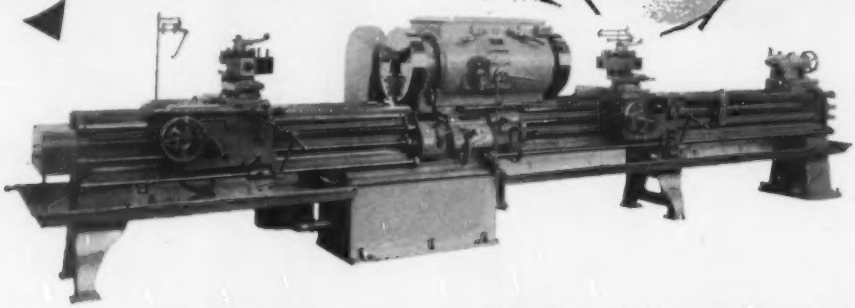
WORK FROM Both Ends with...

LEHMANN LARGE HOLE DOUBLE-ENDER HYDRATROL LATHES

18″ x 13 foot x 6 foot Double-End Hydratrol, hollow spindle, Engine Lathe; with 7⅛″ hole in spindle; having hardened ways and a 10″ long spindle extension. Equipped with carriages on both beds. Arranged for power feed and thread cutting. Tailstock for additional work between centers.



Double-End Hydratrol Lathes are built in sizes from 18″ with holes up to 7⅛″ to larger sizes with holes to suit the job. Double-End operations avoid necessity for resetting the work, and insure relative concentricity of boring and turning operations and squareness of faces at both ends.

50″ swing—50 foot length, 19″ hole in spindle. 24″ Hexagon Turret on carriage with profile bar for profile boring and grinding. Retractable diamond profile wheel dresser. Weight 72,000 lbs.

LEHMANN MACHINE COMPANY
GRAND at CHOUTEAU • ST. LOUIS 3, MO.

DIVISION OF NOVO ENGINE CO.

Boring Tools by Lehmann

"Solved! ...The case of the rusty fingerprints"

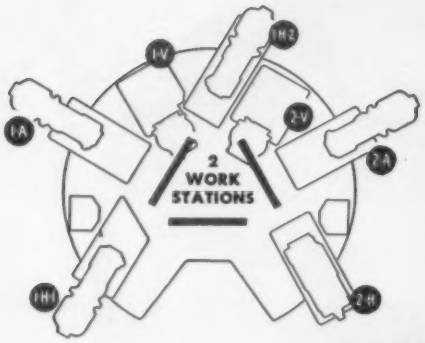
On one of his periodic visits to a large piston ring manufacturer, Sinclair Lubrication Engineer Don Rigg ran into a peculiar rusting problem. Mr. Rigg reports, "Customers were returning a considerable number of the company's rings because of rust spots and *rusty fingerprints*. Observation of the manufacturing process showed the rings were dipped in a rust preventive oil after being machined, then they were packaged and stored. *The fingerprints could only have come from the packers* and were due to failure of the rust preventive."

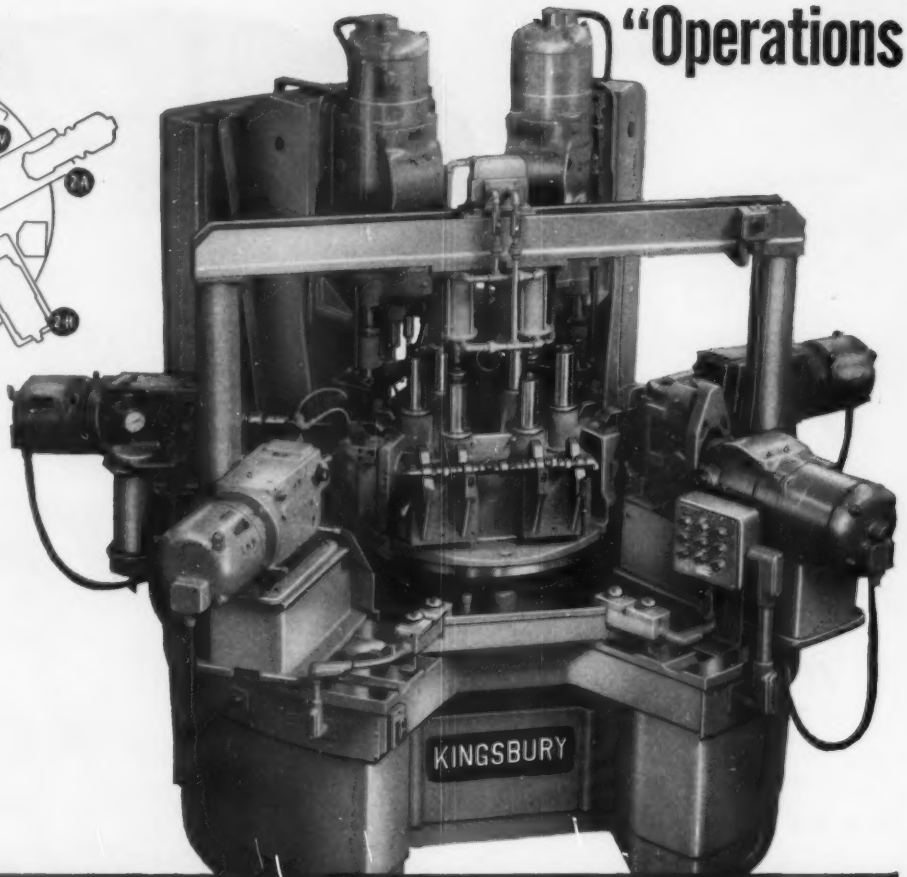
Mr. Rigg continues, "I recommended the use of Sinclair RUST PREVENTIVE 142 because it imparts a tough, protective film, impervious to finger marks and metal to metal contact. The fact that this company switched to Sinclair RUST PREVENTIVE 142 and has been using it exclusively for 3 years is ample proof of results."

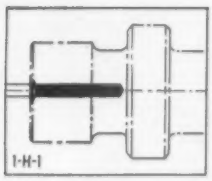
SINCLAIR LUBRICANTS

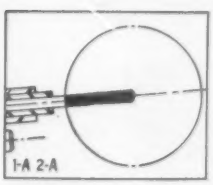
Why not give a Sinclair Lubrication Engineer the chance to help solve *your* rust and lubrication problems. *There's no obligation.* Contact your local Sinclair office or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

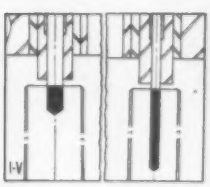
"Operations

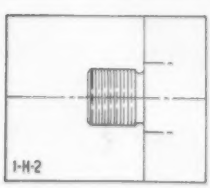


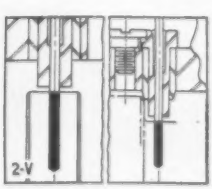


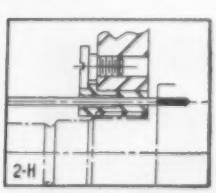


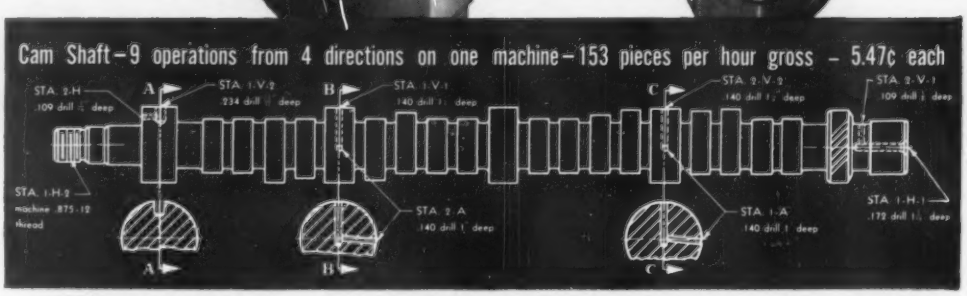












Watch these two Kingsburys perform 23

This machine cuts a thread and drills eight holes.

The part is a cam shaft, 22 inches long. Print called for a thread, two longitudinal holes, 6 cross holes, and a milled keyway.

The threading and drilling operations could all be performed within the time cycle required for maximum production. The milling operation required more time. It was decided to build two Kingsburys: an indexing machine with 80-inch base and 30-inch table; and a non-indexing multi-way machine to perform the milling operation on two pieces.

Indexing Kingsbury: Machine has three stations: one for loading and unloading and two for work. This required that the table index 120° each time.

Seven Kingsbury Units*, mounted on the base, perform all operations at two stations.

Station 1: Unit 1-H-1 drills .172 dia. axial hole 1 5/16 inches deep in end. Unit 1-A drills .140 dia. hole 1 inch deep at C-C. Unit 1-V has two spindles. One spindle drills .140 dia. hole 1⅛ inches deep at B-B; the other drills .234 dia. hole 11/32 inch deep at A-A. Unit 1-H-2 threads .875-12 end of shaft.

Station 2: Unit 2-V has two spindles. One spindle drills .109 dia. hole to connect at 90° with hole drilled by Unit 1-H-1; the

*Three units are Horizontal (H), two at an Angle (A) and two are Vertical (V).

Kingsbury" means Precision with High Production

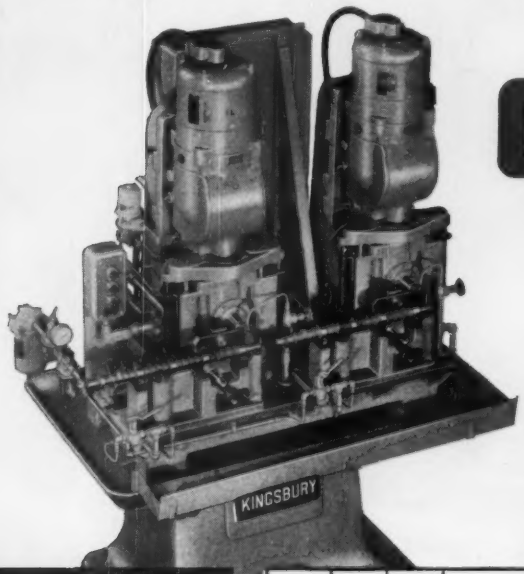
The term "Precision — with High Production" covers a lot of territory. Precision is essential — high production optional. A giant indexing machine with nine working stations pays for itself because it drills, reams, c'sinks, hollow-mills, taps and threads a simple, inexpensive valve body to the tune of 550 pieces per hour. A non-indexing machine pays by performing a single milling operation on an expensive cam shaft.

Combining operations increases production, insures interchangeability with its required accuracy, reduces handling, practically eliminates scrap loss, releases valuable floor space . . . .

All these considerations add up to make a Kingsbury a wise investment.

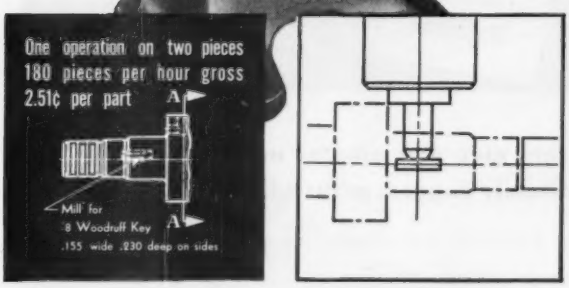
Are you really interested? If so, we'd like to see you.

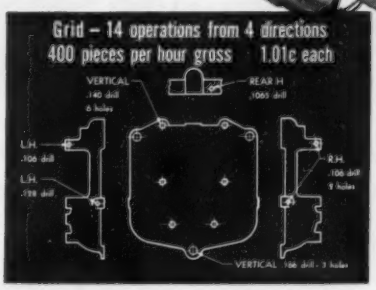
Kingsbury Machine Tool Corporation
105 Laurel St., Keene, N. H.



KINGSBURY

AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production





+3 operations per minute

This machine mills a keyway.

other drills .140 dia. hole 1⅛ inches deep at C-C. Unit 2-A drills .140 dia. hole 1 inch deep at B-B. Unit 2-H drills .109 dia. hole to connect at 90° with hole drilled at A-A by Unit 1-V.

At the loading station a pair of pneumatic rams release the locking devices which locate and clamp the shaft securely in the work fixture. Bushings located in the fixture guide all drills.

The nine operations are accomplished in approximately 24 seconds, permitting ample time for loading and unloading.

Multi-Way Kingsbury: Machine has two units arranged in line, with two work fixtures. Each unit mills a keyway at threaded end of shaft, .155 wide and .230 deep on sides. Operator loads and unloads each work fixture alternately.

Kingsbury Multi-Way Machine

performs 93.3 operations per minute.

The part is a cast iron grid. The job requires 14 holes from 4 directions.

This is a good example of multiple operations in a non-indexing machine. Three horizontal and one vertical unit are located on the base so as to work directly on the part from the right, rear, left and above. The work fixture remains in one position. Machine is loaded and unloaded at the front.

Operator locates the part on guides and moves it onto locators within the fixture. Handle mechanism locks the part in position. Bushings are located in the fixture and guide all drills.

The left and right unit have two spindles each; the vertical unit has nine spindles.

Davis "Super Micrometer" stub boring tool sets give you greater machine use by eliminating cut-and-try boring. They are extremely rugged, adjustable to .0001 in.

With these handy, production-boosting tool sets you have high precision tools for handling heavy boring assignments from ⅜ to 7 in. diameter . . . light, extended boring up to 13 in. diameter.

Set No. 11 (illustrated) contains seven stub boring tools covering a boring range from 1½ to 7 in. It is one of the ten complete, convenient, standard sets for you to choose from.

Modifications in any set can be made to meet your exact requirements.

Available for almost immediate delivery, these sets are all equipped with high-speed steel cutters. Stellite, super-high-speed steel or tungsten-carbide tipped cutters can be furnished upon request. Some sets include offset boring heads, pencil boring heads and reducing sleeves . . . plus setup items such as parallels, adjustable stop jacks and T-slot parallel blocks.

See your representative or write for details.

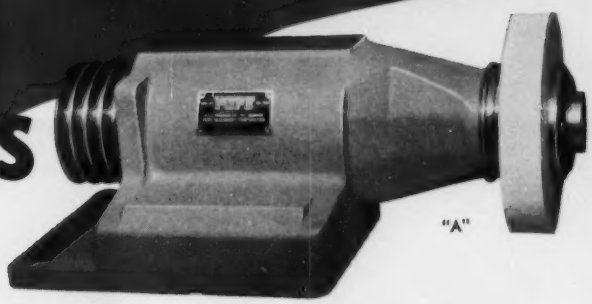
If Davis can't bore it — it can't be done

Davis Boring Tool Division
GIDDINGS & LEWIS MACHINE TOOL COMPANY
FOND DU LAC, WISCONSIN

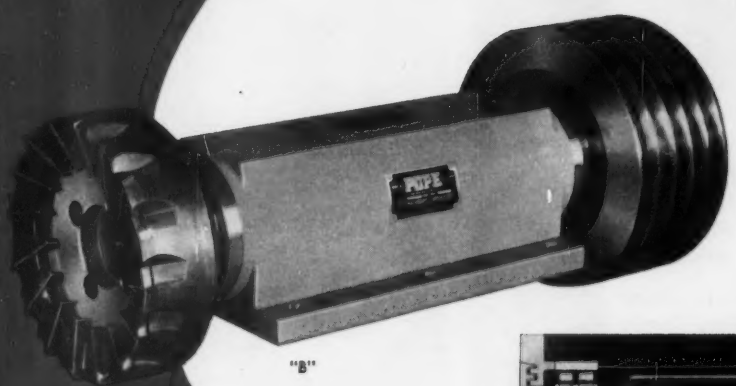
Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

Specify POPE

HEAVY DUTY WHEEL HEADS



"A"

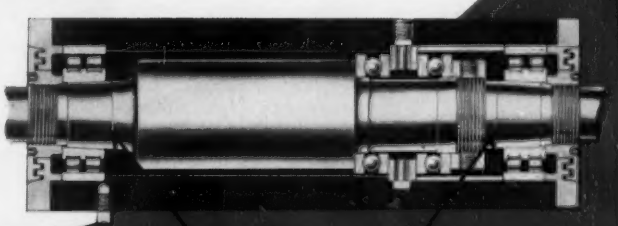


"B"

Note the big precision bearings and the big shaft.

A pair of precision thrust bearings stabilize the shaft against any axial movement in either direction. (No end play)

The double row cylindrical roller bearings carry the radial loads with ease and at low temperature.



Send us your specifications and ask for quotations.

Taper mounting provides for precise individual preloading of the radial bearings

POPE Heavy Duty Wheel-Head Spindles are designed for a wide variety of applications such as grinding, boring, milling, drilling and many other operations requiring PRECISION COMBINED WITH RUGGEDNESS in the spindles.

For continuous production and trouble-free operation THERE'S NOTHING LIKE A POPE SPINDLE WITH ROLLER BEARINGS.

No. 94

Specify POPE PRECISION SPINDLES

POPE MACHINERY CORPORATION

Established 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

New RA Welder means greater welding performance

Rectifier welder pioneered by Westinghouse now provides many added advantages

Here is the *all-new* RA Welder, truly the finest, fastest and easiest, *any* position, d-c welding machine on the market. Westinghouse, the pioneer in rectifier type d-c welding equipment, has incorporated in the new welder all the engineering know-how and years of "on-the-job" welding performance needed to make the "RA" a *proved performer*. The exclusive features alone —Arc-Drive Control, Built-in Automatic Overload Protection, Single-Range Stepless Current Control— set new quality and performance standards for the welding industry.

Take the Arc-Drive Control for example: This exclusive Westinghouse feature provides an extra "push" to the metal as it leaves the electrode and moves toward the welding surface. This extra "push" assures greater weld penetration. In addition, the Arc-Drive Control enables the operator to quickly and easily adjust the arc-drive current to fit the needs of the particular job.

Another feature is the new "on-off" switch—the AB De-ion® Circuit Breaker. This circuit breaker provides positive and automatic protection against excessive overheating, yet permits harmless temporary overloads without interrupting production.

A rugged frame and a *Bonderized* sheet-steel case enclosure provide maximum protection for both indoor and outdoor operation.

Superior ventilation combines the use of natural air flow and a fan powered by a dependable, nonreversible, totally-enclosed, 1/8-hp motor with prelubricated ball bearings. Specially designed air ducts within the unit provide for free and dependable passage of cooling air—this means longer life.

Features like these—the result of years of experience in producing rectifier welders—put the Westinghouse RA Welder ahead of other types of d-c welding equipment. Get all the reasons why the Westinghouse RA Welder is the best buy. Ask your Westinghouse representative for full details, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

COUNT ON THESE DEFINITE ADVANTAGES

- **ARC-DRIVE CONTROL** provides for greater weld penetration.
- **SINGLE-RANGE, STEPLESS CURRENT CONTROL** allows infinite number of current settings with single-dial adjustment.
- **THERMAL OVERLOAD PROTECTION** is provided by an automatic circuit breaker.
- **SUPERIOR VENTILATION** affords greater natural cooling . . . longer winding life.
- **WEATHERIZED CONSTRUCTION** offers maximum indoor and outdoor weather protection against snow, rain, water and the most rugged of operating conditions.
- **QUIET OPERATION** means less operator fatigue and provides longer machine life through elimination of moving parts.

J-21835

YOU CAN BE SURE...IF IT'S Westinghouse

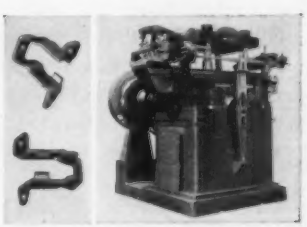
OVERTIME PRODUCTION in a 40-hour WEEK

If you have to produce more in a given time — the proven answer is a Henry & Wright Dieing Machine. Here is the capacity that enables you to keep pace with sudden scheduling changes; the consistent accuracy that permits you to set and automatically meet higher standards of work quality, while reducing cost.

In the Henry & Wright Dieing Machine, you have a production tool designed for high speed, built to widen radically the practical application of progressive stamping and engineered to prolong the life of your dies. Outstanding in its application for light and medium gauge metals, the Dieing Machine is also demonstrating that it can achieve equally extraordinary results in stamping and forming heavy gauge parts.

You owe it to yourself to include the Henry & Wright Dieing Machine in your plans for modernization, expansion or replacement. We welcome an opportunity to discuss its specific application to your requirements.

25-ton Henry & Wright Dieing Machines with twin die set-ups produced 435 parts per minute per machine at Barber-Colman.



250-ton Henry & Wright Dieing Machine producing 54 completed hinge boxes per stroke from 5/32" x 13" steel in coil form.

ONE SET UP INSTEAD OF MANY WITH H&W DIEING MACHINES

HELPFUL DATA *is available in our fact-packed catalog which you can have by writing Henry & Wright, 481 Windsor St., Hartford, Connecticut.*

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

HARTFORD, CONNECTICUT

★Stop and say hello at the ASTE Show—Booth 1060

Part—Bronze casting of triple duplex oil filter for ships. Similar operations also performed on cast iron.

Machine—Monarch 20" Model M Heavy Duty Lathe with Monarch's exclusive Anti-Friction Taper Attachment.

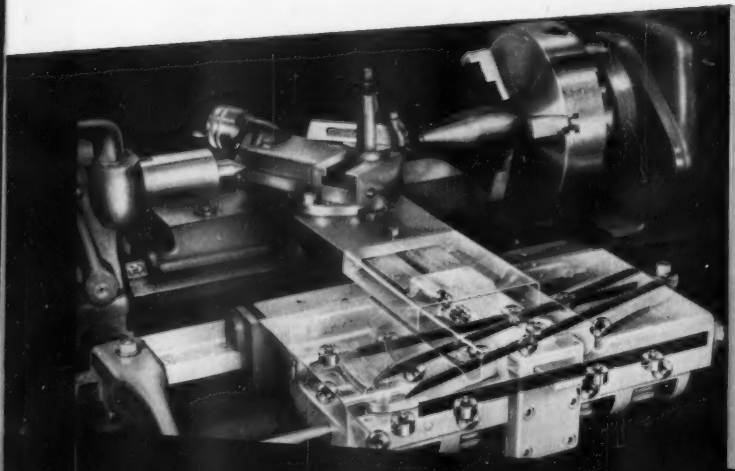
Operation—Finish bore hole with 2" per foot taper.

Limits—Large diameter, ±.002". Taper of bore and plugcock must match perfectly within an angular tolerance of ±0° 0′ 15"—*the equivalent of an extreme 1/120 of a degree.*

Comment—Previous operation of boring and hand lapping averaged 5 hours—sometimes took 2 days. Monarch reduces this time to *3-4 minutes*, as the sturdiness of the machine plus the inbuilt and lasting accuracy of the taper attachment produce such accuracy and finish that succeeding operations are eliminated. Required seal is provided by the machine—without lapping. "This taper attachment does the job," says the user!

Finish boring time 3-4 minutes, with Monarch's exclusive Anti-Friction Taper Attachment—against old production time of 5 hours, average. Production increase 100 to 1!

MONARCH CUTS TAPER TURNING COSTS LIKE THIS



Check over the unique Monarch anti-friction bearing taper attachment

Smooth, accurate tapers consistently turned or bored due to use of ball bearings with permanent, sealed-in lubrication. No bearing surfaces to clean after a period of non-operation.

Use of ball bearings practically eliminates lost motion, backlash and friction.

Bearings mounted on eccentric studs which provide adjustment, should it ever be required.

All bearing surfaces against which ball bearings take a bearing are flame hardened, precision ground.

Construction permits the taking of exceptionally heavy cuts even when boring or turning acute angles without sacrifice of accuracy.

That's the story—plain facts—straight details—no romance. We pioneered the ball-bearing taper attachment in 1935, have been improving it ever since, and have long since ceased building any other type. And this kind of pioneering isn't confined, here at Monarch, to any single attachment. Write us, whatever your requirements in lathes . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES
FOR A GOOD TURN FASTER . . . TURN TO MONARCH

■ Forget all your old ideas about press accuracy when you examine a Minster press. Here is a modern machine tool built to surprisingly accurate tolerances. Here is a press built with such care and precision that it has become the most wanted power press in all America.

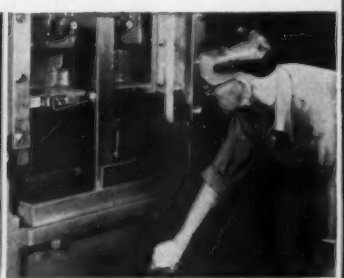
Every wear surface, every moving part is checked for dimensional accuracy. Hand finishing is standard procedure. In fact, visitors to the Minster plant are invariably impressed with Minster's combination of fine personal craftsmanship and the use of the very latest in fine precision machine tools.

Yes, accuracy is a Minster tradition. The result, of course, is longer life, less maintenance, easier die setting, and higher production. Next time, specify Minster, a press of outstanding design, beautifully built from crown to base.

■ Punch shank hole must be correctly aligned with the face of the slide. All details are important details at Minster.

■ Accurate bearing fit is a Minster characteristic. Bushings are fitted in frame and caps . . . bearings are then finished to match crank bearing surfaces . . . bore diameters are checked.

■ Gib surfaces must be square with the face of the slide. At the Minster plant such inspections are routine procedure.



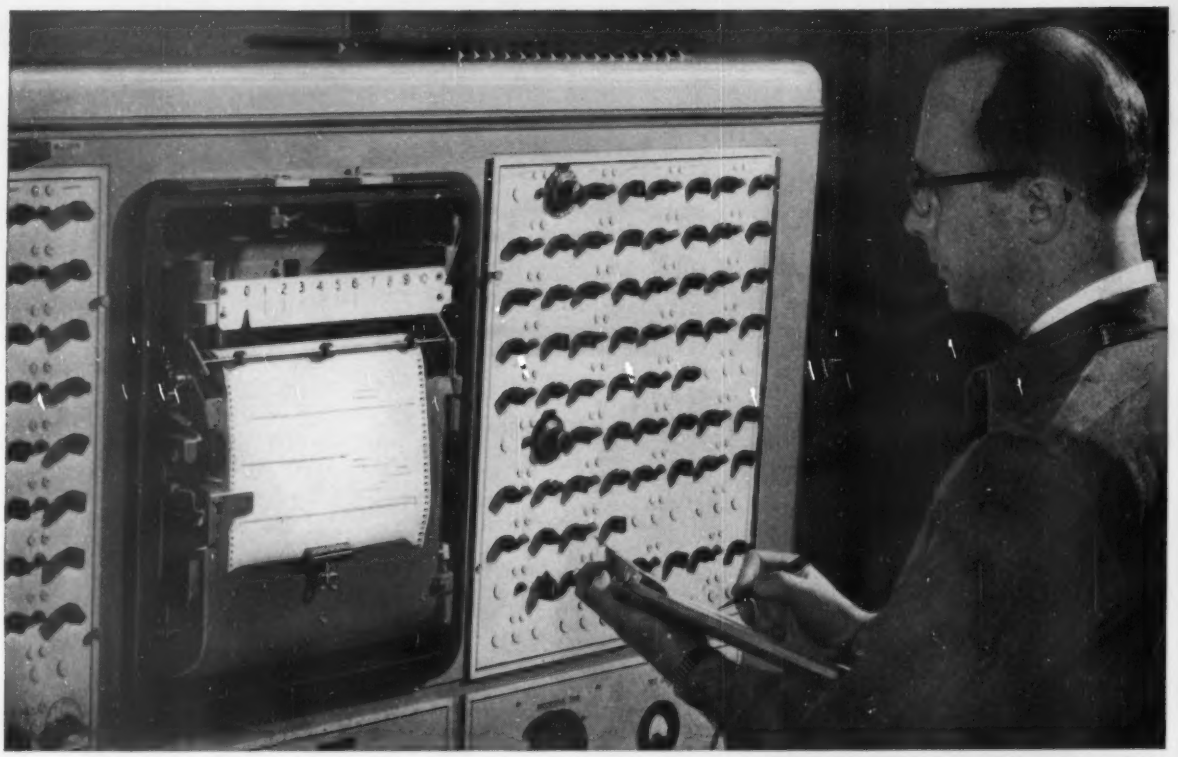
■ Vertical travel of the slide is gaged in two directions to insure extreme accuracy throughout the entire stroke.

■ Minster S-1, single crank straight side press. One of ten press series including knuckle joints, inclinables, horning, gap, double crank, and deep throat presses.

MINSTER
FIRST IN **PRESS** DESIGN

THE MINSTER MACHINE CO.
MINSTER, OHIO

SURE, we're sure you're getting the right copper alloy!



CHASE metallurgists use fantastically accurate instruments to check the brass shipped to you in wire, rod, sheet or tube.

The Quantometer, for instance, tests a brass sample for 18 elements in 1½ minutes.

An Electron Microscope, Spectroscope, and an X-ray Diffraction Unit are also part of Chase laboratory equipment so that we can be absolutely certain that the Chase brass you buy has exactly the right composition, grain structure, temper, dimensions and other physical characteristics your product requires.

Here a brass sample is being inserted into the arc-spark stand of the Quantometer for analysis. In a matter of only 1½ minutes, sample will be completely analyzed.

Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

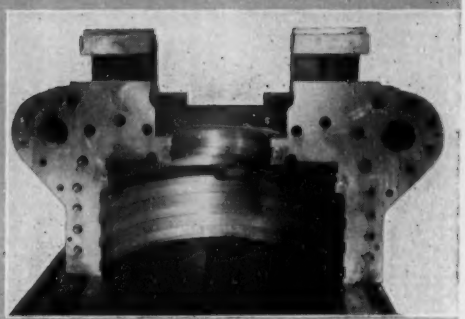
The Nation's Headquarters for Brass & Copper

Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	
Chicago	Houston	Newark	Rochester†	(†sales office only)
Cincinnati	Indianapolis	New Orleans	St. Louis	

BICKFORD *for big work...*

This powerful Cincinnati Bickford Super Service Radial Drill was purchased to facilitate handling of "big work." It was the right machine for the job. In the complete line of Cincinnati Bickford Radial Drills, with their many outstanding features, is the right machine for you.

Write us for descriptive literature, or consult our Engineering Department on drilling needs.



Photos—Courtesy Worthington Corporation, Steam Turbine Division, Wellsville, N. Y.

Here 3" pipe tap holes are being drilled and threaded in 3000KW Turbine Generator End Casing.

CINCINNATI BICKFORD

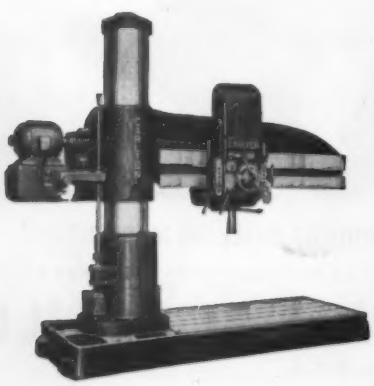
RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

Only ONE can be called the Finest: Carlton

. . . here's another good reason why: low maintenance cost



CARLTON RADIAL DRILLS cost less to maintain because they are *designed for less maintenance attention.* For example: there's only *one* friction clutch to adjust. There are *no* tapered gibs to adjust because the head travels across the arm on hardened steel ways. Automatic lubrication throughout eliminates the damage and unnecessary wear that occurs in ordinary radial drills.

COMPARE CARLTON AND YOU'LL BUY CARLTON. Judge for yourself why Carlton radial drills are the first choice of American industry. Write for bulletins. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

NATIONAL ACME *Announces*

for small work machined from the bar

Made in 5 sizes—½, ¾, 1⅛, 1⅝ and 2" capacity. **LITERATURE ON REQUEST.**

As distributors in the United States for British-built **B. S. A. Single Spindle Automatic Screw Machines,** National Acme now offers proven, high production, fully-automatic single spindle machines for smaller work in this class—5 machine sizes, ½ to 2" capacity. Thus, for the first time, you have available from one reliable source THE ONLY COMPLETE LINE of single and multiple spindle automatics covering all classes of bar machine work from the very smallest to 7¾" diameter.

Built by B.S.A. Tools Ltd.—for 50 years a leading British builder of precision machine tools—these single spindle models feature greater convenience and safety for the operator . . . wide variety of spindle speeds with automatic speed changes . . . structural rigidity to maintain high speed precision operation . . . the latest developments in design of automatics.

Highly versatile tooling arrangements and quick changeover from job to job make the B.S.A. Single Spindle Automatic ideal for both long and short run production on small parts at lowest per-piece-cost.

The NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS
1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

LONG LIFE!

1

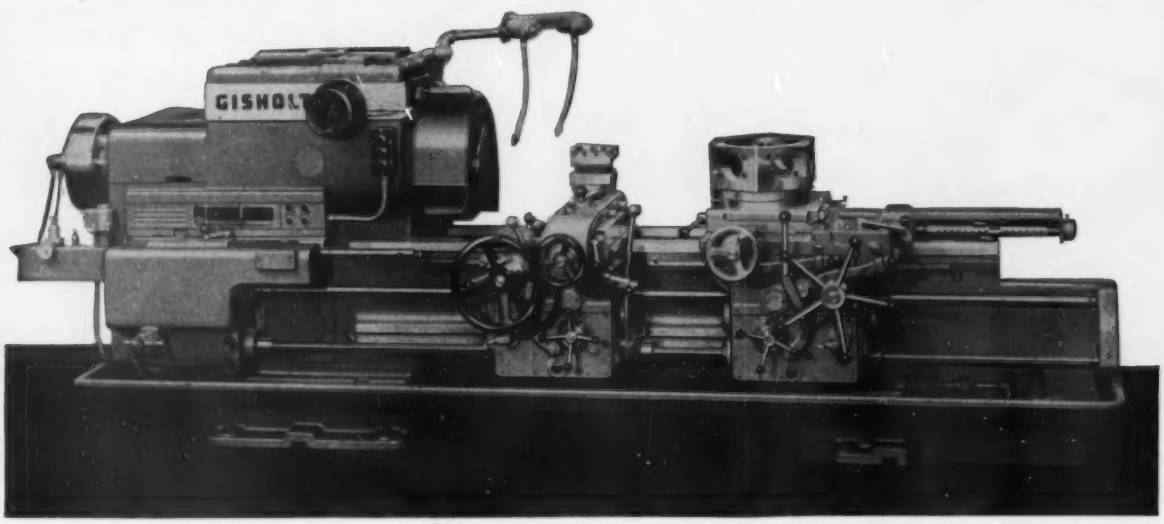
All gears in Gisholt turret lathe transmissions are high carbon alloy steel, precision ground after heat-treatment to assure long wearing quality. All shafts turn on antifriction bearings, with pressure spray lubrication. Headstock is cast integral with bed for extreme rigidity—to maintain accurate, permanent alignment.

2

Gisholt's thick, block-type ways are automatically pressure lubricated. Made of SAE 52100 tool steel, they are deep hardened to 64-66 Rockwell C and then finish-ground for exact alignment with the spindle. On top, bottom and both sides, they present a bearing surface that is virtually wear-proof—accurate for years to come.

3

Aprons are fully enclosed, all working parts protected and operating in a continuous cascade oil bath. Alloy steel gears and shafts are mounted on antifriction bearings. Positive serrated feed and traverse clutches cannot slip or drag. Safety shear pins protect feed and traverse mechanism against overload and accident.



You'll find all the speed and easy operation you want in these new Gisholts. But you want long life, too. Here's the lasting accuracy, freedom from repair bills and proved performance that protect your turret lathe investment for years to come.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

YES, THAT'S A TWIST DRILL

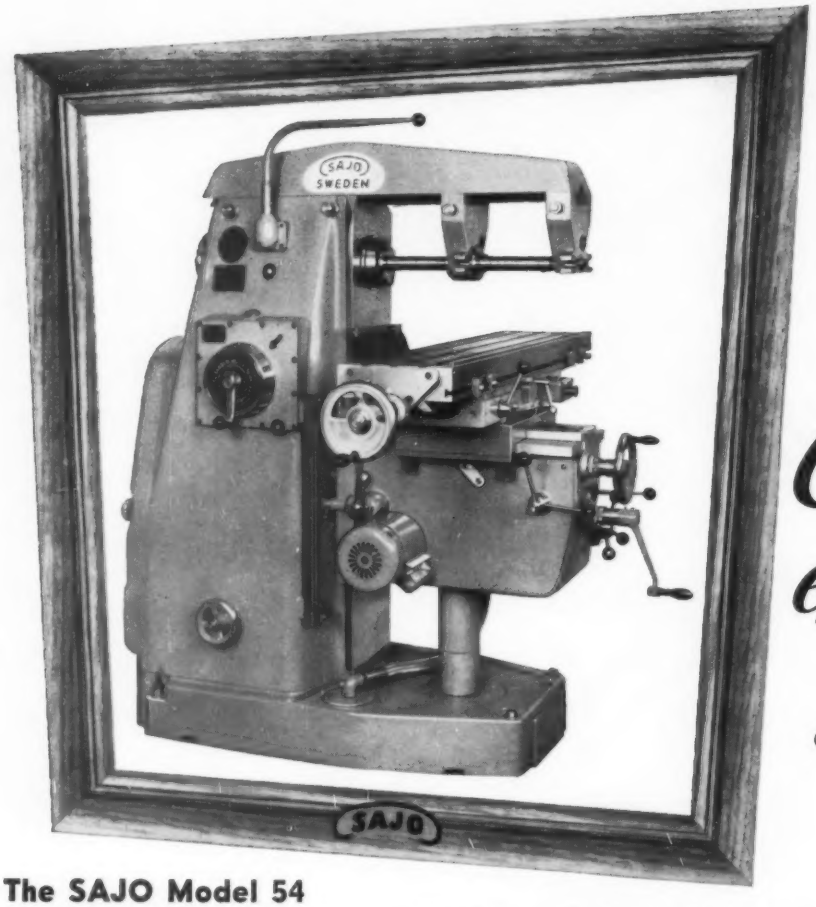
A few minutes ago it was a bar of high grade tool steel equal to that used in any drill to be found. Now this steel is being *further* refined and toughened by hammer forging, the process universally used by the makers of high quality tool steels.

All GTD-AMPCO drills over 1″ are hammer forged before twisting. And the flutes are polished, too.

AMPCO TWIST DRILL DIVISION

GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASS.



Classic example

OF SWEDISH CRAFTSMANSHIP

The SAJO Model 54
No. 2 ALL-GEARED Milling Machine, Plain or Universal

is an outstanding example of Swedish craftsmanship and fine quality materials, combined in a modern design.

Capable of continuous dependable service under the most severe conditions and guaranteeing maintenance of accuracy to tenths, the SAJO Model 54 Millers meet all requirements for:

ASTE SHOW BOOTH 1334

POWER . . . . . 7½ HP motor drive to spindle (5 HP optional).
1½ HP table feed and rapid traverse motor.

RANGE . . . . . 16 spindle speeds 39-1500 RPM (optional 31-1200 RPM).
12 table feeds 11/16" to 25"/min. longitudinal and cross.
11/32" to 12½"/min. vertical.
Power rapid traverse 80"/min. longitudinal and cross. 40"/min. vertical.
Table travel longitudinal 33½". Cross 10". Vertical 18".

ACCURACY . . . . Handscraped sliding surfaces, Spindle (#50 NMT taper) mounted in four precision SKF bearings ensuring constant smooth operation and fine finish.

SIMPLICITY . . . . . Single adjustable START-STOP-BRAKE lever, Dial selection of speeds and feeds.

Priced well below levels of comparable top grade millers.

Prompt delivery. Full selection of accessories available.

Also available: SAJO No. 2 Light Duty Plain or Universal Millers.

For information write to:

austin industrial corp.

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Dealers in principal cities

Look for the Austin Seal—your full guarantee of satisfaction.

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You'll never have to "kick" about quality if your Small Gears are made by G.S. Now, the simplest or most intricate Gearing can be made to measure up to the most exacting specifications. That closely controlled accuracy holds true of EVERY ONE . . whether your needs call for hundreds or thousands!

The mass production of fine custom Gearing from 12 to 96 D.P. is the *only* thing we do! Unique methods developed during 30 years of constant improvement have reached a degree of perfection unapproached in the history of the industry.

More and more critical customers buy G.S. Gears regularly, year after year. Chances are you, also, will like the friendly, *capable* help we can give.

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Specialties, Inc.

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WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARING

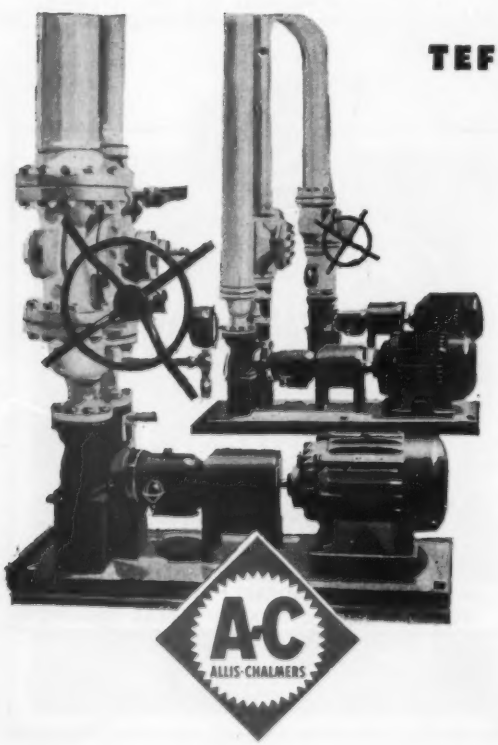
GREATER PROTECTION AGAINST FOREIGN MATTER — LONG

new motors - new

OPEN — DRIP-PROOF

Here are a few of the reasons why the new Allis-Chalmers open—drip-proof motor in NEMA rerate sizes will give you better performance and lower maintenance costs in general-purpose applications.

- Better protection against falling water and debris because cooling air inlets are on bottom.
- Long bearing life because large grease chambers provide plenty of reserve lubricant and are thoroughly sealed against foreign matter.
- Quieter operation, smoother performance.



TEFC and EXPLOSION-PROOF

For especially dirty, corrosive or hazardous applications, you will get top performance with low maintenance costs from the new Allis-Chalmers totally-enclosed, fan-cooled and explosion-proof motors in NEMA rerate sizes. Here are a few of the reasons:

- Foreign matter kept out of bearings and motor interior by double labyrinth seals inside and outside of bearings, and long running fits between shaft and seals.
- Bearing maintenance reduced because large grease chambers provide space for reserve lubricant; also, if required, grease may be renewed without dismantling.
- Easy to clean — no inaccessible air passages. Dirt wipes or blows off easily.

ALLIS-

LIFE BEARINGS—MANY TRIED AND PROVEN FEATURES

GET COMPLETE INFORMATION NOW

Allis-Chalmers, Milwaukee 1, Wis.

Send for these bulletins:

- ☐ Open — Drip-Proof, Type G, 51B6210
- ☐ TEFC, Type GZ, 51B7225
- ☐ Explosion-Proof, Type GZZ, 51B7286

Name.....

Company.....

Position.....

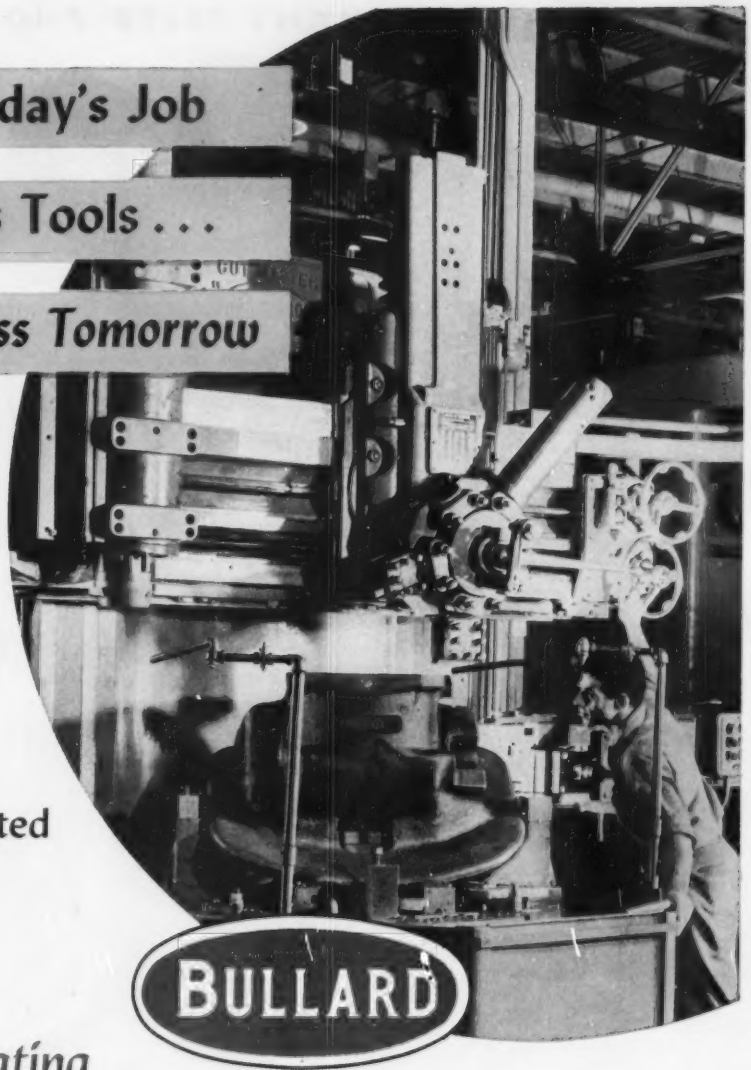
Address.....

City and State.....

A-4280

CHALMERS

You Can't Do Today's Job With Yesterday's Tools . . . And Be In Business Tomorrow



new products,
new methods,
new materials
and new cutting
tools have out-dated
many machine
tools still in use

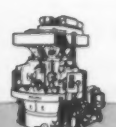
BULLARD

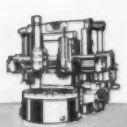
Is your plant operating under this handicap?

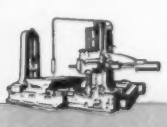
If so, it will pay you to investigate the Bullard Cut Master Vertical Turret Lathe.

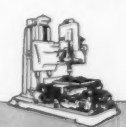
It is available in six sizes, 30-36-42-54-64 and 74 inch, incorporating outstanding engineering developments which increase production, ease of handling and accuracy; and decrease maintenance — insuring greater profits through lower manufacturing costs.

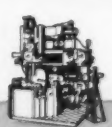
For full details, call your nearest Bullard Representative or write to:


CONTIN-U-MATIC


CUT MASTER

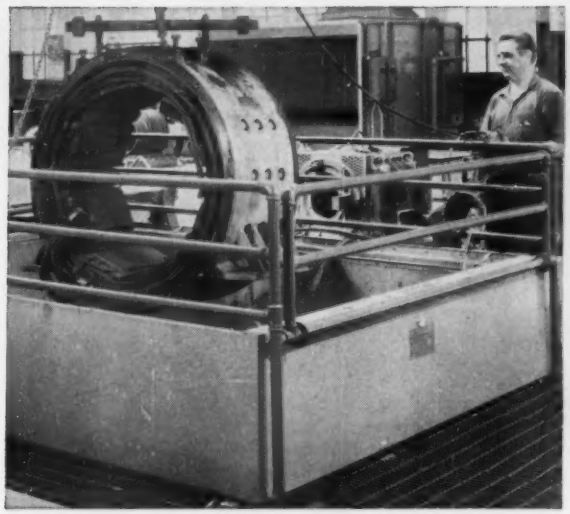

HORIZONTAL BORING


SPACING TABLE

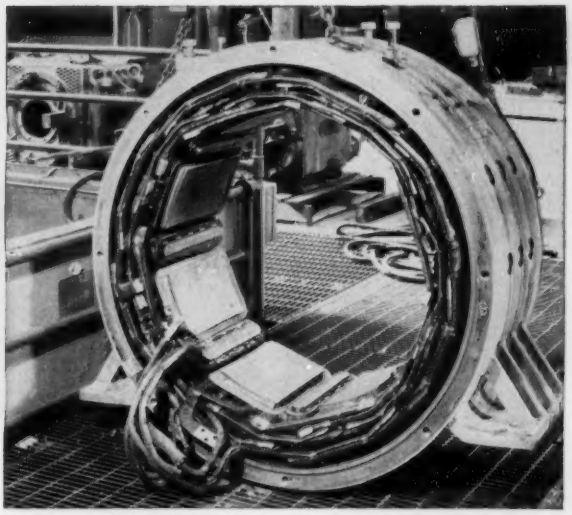

MAN-AU-TROL

MULT-AU-MATIC

THE BULLARD COMPANY · BRIDGEPORT 2, CONN. Telephone 6-2511



A GENERATOR STATOR is lowered into degreaser. Grime on intricate armature wiring is quickly dissolved by "Triclene" D vapors.



AFTER 5 TO 10 MINUTES the generator stator is removed from the degreaser thoroughly clean and completely dry.

Vapor Degreasing with TRICLENE® D

(*Trichlorethylene*)

cuts cleaning time from hours to minutes

Many industries are saving valuable man-hours in metal cleaning by vapor degreasing with Du Pont "Triclene" D. In the railroad industry, for example, "Triclene" D completely dissolves dirt and grease from traction motor and generator parts in 5 to 10 minutes. The same job used to take 4 *hours* with two men working together!

Another tough job was cleaning the wheels on diesel locomotives—requiring 8 man-hours by conventional methods. Vapor degreasing with "Triclene" D does it *more* thoroughly in just 10 minutes! And so the list of examples could be continued in many industries, where the vapor degreasing process teamed up with "Triclene" D saves time and labor.

"Triclene" D is specifically designed for vapor degreasing and is the result of over 20 years of research by Du Pont—pioneer manufacturer of chlorinated hydrocarbon solvents. You'll find proof of this experience and know-how when you see "Triclene" D at work. It's a pure and stable solvent—at its best on industry's toughest cleaning jobs. And experience does the talking when you call in a Du Pont technician . . . his grasp of metal cleaning problems is unique in the field.

Get the full story of vapor degreasing with "Triclene" D by mailing the coupon below, or calling our nearest district office.

DISTRICT OFFICES: Boston • Charlotte • Chicago • Cincinnati Cleveland • Detroit • El Monte (Calif.) • New York • Philadelphia

SEND THIS COUPON FOR FREE BOOKLETS

"TRICLENE" D

(*Trichlorethylene*)

the Rugged Degreasing Solvent

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

E. I. du Pont de Nemours & Co. (Inc.), AM-315
Electrochemicals Department, Wilmington 98, Delaware

Please send me the literature checked below:

- ☐ "How trichlorethylene is used in metal cleaning."
- ☐ "Triclene" D—an improved vapor degreasing solvent.
- ☐ "Metal degreasing—standard practices."
- ☐ Du Pont publication, "MODERN METAL FINISHING." (Please add my name to the mailing list.)

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CARBOFLEX

TRADE MARK

depressed center wheels

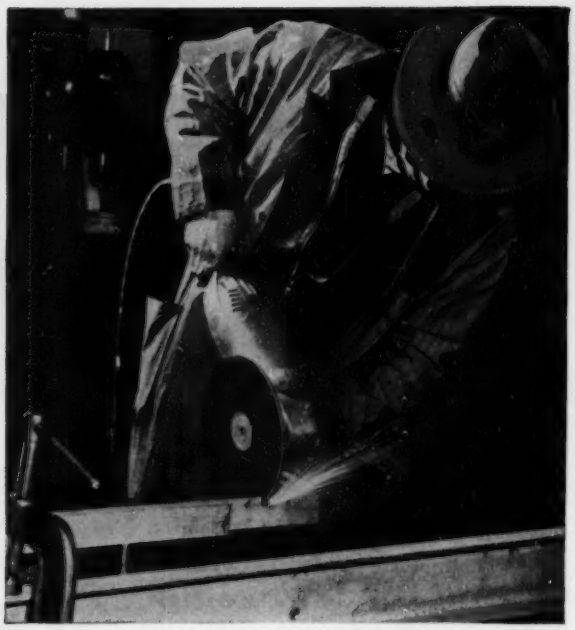
BRAND NEW...FOR FAST, SAFE

Reduce rough welds... *fast, safely!*

Remove flash from castings... *fast, safely!*

continually putting **more sense** in your **abrasive dollar**...

Finish rough edges... *fast, safely!*



Cut off or slot... *fast, safely!*

ROUGH GRINDING AT LOW COST

Roughing? Grinding Welds? Cutting off? Slotting?—here's a great new cost-cutter by CARBORUNDUM to help you do a fast, safe job. CARBOFLEX Depressed Center Wheels are strongly reinforced for complete operator safety, yet give you an *extra-high rate of cut.*

Here are some typical jobs where CARBOFLEX Depressed Center Wheels have proved their superiority: under-cutting and reducing heavy welds, cleaning castings, roughing off fins and sharp edges, notching and cutting off gates and risers, removing surface defects, and general purpose roughing, slotting and cutting off.

An exclusive feature of the CARBOFLEX Depressed Center Wheel: the back, as well as the face, is knurled. You can cut with either side plus the edge, without initial dressing.

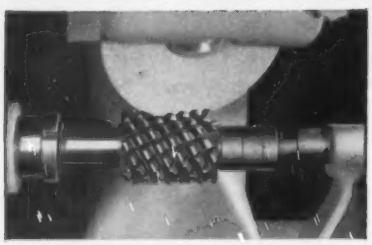
The right combination of tough, top-quality abrasive grain and a strong, reinforced bond is what makes CARBOFLEX Wheels so effective. Tough, durable CARBOFLEX Depressed Center Wheels combine extreme high strength and resistance to cracking with maximum cutting ability... the only combination that gives you more production per wheel at less abrasive cost.

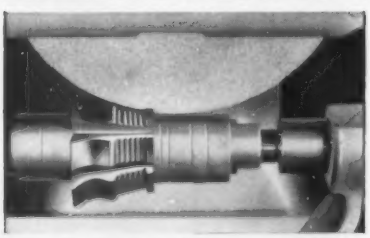
Use CARBOFLEX Depressed Center Wheels on your toughest jobs. You'll be more than pleased with the results!

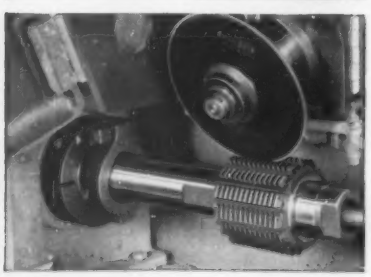
● **OUR DISTRIBUTOR OR SALESMAN** is ready to demonstrate this new cost-cutter. He's listed in the yellow pages of your telephone directory—under "Abrasives" or "Grinding Wheels." Call him... or, if you prefer, write to The Carborundum Company, Dept. AM 81-41, Niagara Falls, N. Y.

CARBORUNDUM

81-41







Controlled Accuracy with
Automatic Sharpening
For Hobs and Formed Cutters

For the finest in tool accuracy, correct sharpening is essential. The accuracy for which you pay in hobs, cutters, machines, blanks, tooling and labor — is lost immediately when hobs and formed cutters are improperly sharpened.

Without precision control of tool sharpening, lead, tooth profile and other elements may lose important accuracy originally built into the tool. This loss of accuracy produces faulty pieces, rejects, reworks, increased inspection time and lost machine productive time.

Barber-Colman cutting tool experts have developed automatic Hob and Formed Cutter Sharpening Machines in a range that will suit almost every sharpening need for this type of tool. These machines provide means for sharpening hobs and formed cutters to their original tolerances.

dry or wet grinding

Wet grinding can be provided on these machines to handle various kinds of sharpening required on production cutting tools. Basic design of the machines includes protection and sealing of all vital parts against any adverse effects of oil or water coolants. Equipment for wet grinding includes coolant tank, pump and splash guards.

wide range of work

Any tool with equally spaced cutting teeth which requires sharpening across the face of the teeth can be sharpened automatically on Barber-Colman machines. This includes small diameter hobs, hobs 10" diameter up to 1½ pitch, carbide-tipped tools, straight or helical flutes, thread milling cutters and shank type tools.

adaptable for all sizes of shops

Barber-Colman Sharpening Machines range from a moderate cost, basic machine for sharpening a great variety of small or medium size work, up to machines equipped with hydraulic table speed and stroke for large heavy work and production runs. Special equipment for sharpening tapered, special helix or carbide-tipped tools is available. All machines are automatically operated for stroke, index and feed. Each is equipped with a precision built-in wheel dresser.

For maximum cutting efficiency, sharpen your hobs and formed cutters with controlled accuracy — AUTOMATICALLY. Call your Barber-Colman representative and discuss your sharpening problems with him.

No. 4-4 AUTOMATIC SHARPENING MACHINE

No. 10-12 AUTOMATIC SHARPENING MACHINE

No. 6-5 AUTOMATIC SHARPENING MACHINE

SEND FOR COPIES

. . . of these Automatic Sharpening Machine Bulletins. You will find information on the machine which best suits your work.

HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT, 613 ROCK STREET, ROCKFORD, ILLINOIS

HOBS AND MACHINES SINCE 1911

way back in 1941 the LeBlond RT Lathe

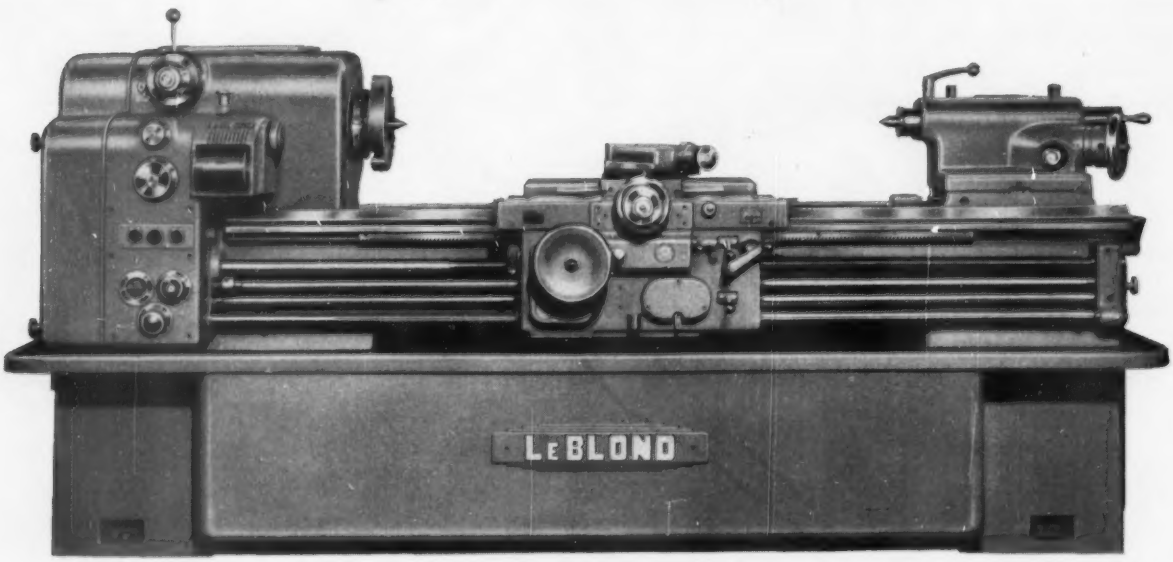
13 years ago, LeBlond's RT Tool Room Lathe with these major

Satin-smooth Power Rapid Traverse to the carriage and cross slide plus pick-up traverse to the tailstock. No jerking, jolting or jumping. Gives you the most in operator convenience as an integral part of the apron. First developed by LeBlond in 1935.

Automatically Positioned Leadscrew and Rod Supports perfected in 1923.

A Universal Quick-change Box with 90 feeds and threads in two ranges. You can cut from 120 threads to ¼ thread per inch — without setting pick-off gears, mounting a sub-head or using any other attachment. Diametral pitch threads, leads in inches, millimeter leads and module pitch leads also can be cut by making a slight gear change. Put into production by LeBlond in 1937.

Automatic Chasing Stop, used primarily for cutting threads, limits cross slide travel positively and accurately. Makes possible speedy chasing, since cross and length power rapid traverse can be used to bring cross slide quickly back to exact starting position for each pass.



Condensed RT Lathe Specifications:

Swing over bed and carriage wings	18½"
Swing over compound rest	11½"
Distance between centers, base length	30"
Spindle speeds, range, rpm	
Low back gear	6 to 60
High back gear	30 to 300
Direct belt drive	150 to 1500
Feed and thread changes	60 regular 30 coarse
Feeds, range	.0007-2.064 ipr
Threads per inch, range	2 - 120 regular ¼ - 1⅞ coarse
Floor space required	96" x 48"

had today's Most Wanted Features

advancements set the standard for lathes today.

RT Combined Feed Apron with built-in Taper Attachment achieved in 1939. Cuts gradual or steep tapers with the larger dimension either towards the tailstock or headstock—without special machine set-ups.

An Exclusive Off-set Handwheel Tailstock employing a worm-and-rack construction for positive-position locking, greater operator convenience plus Hollow Tailstock Spindle adaptability. Equipped with a direct-reading spindle travel indicator.

And in 1946, the ***Variable-voltage Speed Control*** was incorporated into the head to provide over 300 spindle speeds in three ranges controlled by a single lever.

After five years in development and four years of on-the-job testing in LeBlond's production line, Industry met for the first time the 16" RT Tool Room Lathe at the 1947 National Machine Tool Show. There the RT's spectacular features—far ahead of their time—caused a flurry of comment about its amazing versatility. This lathe could do almost anything.

Only within the last few years have tool engineers throughout the lathe industry built into their lathes those features of the LeBlond RT Lathe that were "new" back in 1935 . . . in 1937 . . . in 1941 . . . in 1946. Features that made the RT Lathe famous for the ability to handle almost any job without time-wasting special machine set-ups. Even in 1947, there were many who felt their tool room requirements were not varied enough for them to take full advantage of the RT's vast potential.

By adopting those early RT features on their current models, lathe makers acknowledge the greatness of LeBlond's RT Tool Room Lathe, conceived *almost 18 years ago.*

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

For a detailed description of the LeBlond 16" RT Tool Room Lathe and the lower-priced 16", 16-speed RT Engine Lathe, send for Bulletins RT-31 A and HD-31. A.

turned faster by

LEBLOND *of Cincinnati*

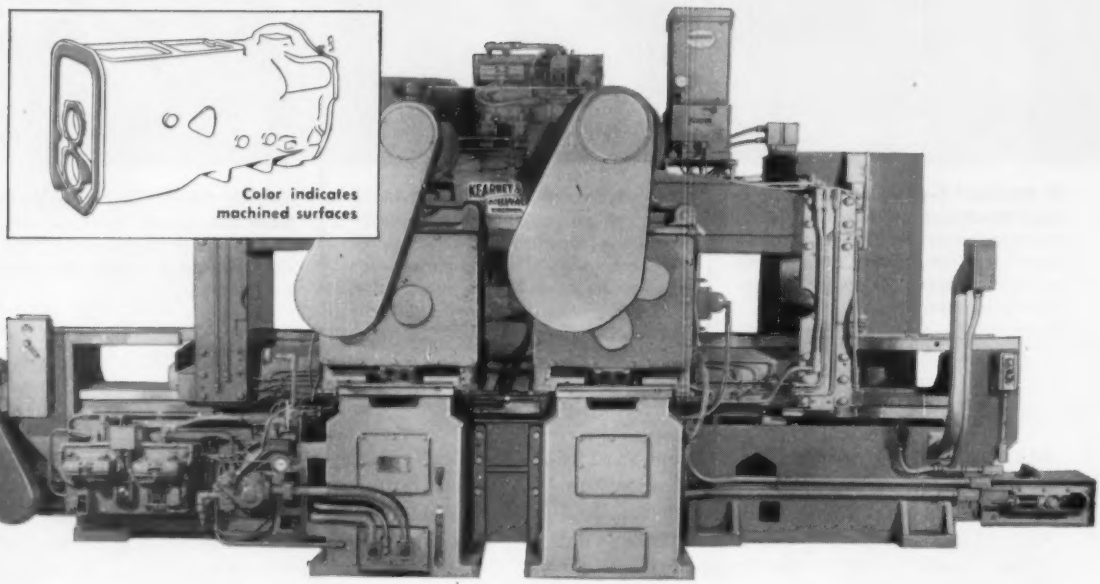
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES—FOR OVER 64 YEARS.

What a saving...

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

Special Machinery Division

Builders of Precision and Production Machine Tools since 1898



For the customer... it combined four milling operations in one machine!

THIS special 6-spindle transfer type milling machine was designed and built to keep a tractor manufacturer's production line rolling at high speed. The machine now mills opposing end faces of tractor transmission cases both flat and parallel... to close tolerances (.002)... in only 94 seconds.

FOUR HYDRAULICALLY RETRACTING HEADS... First two heads have two spindles each for roughing. Second two heads have one spindle each for finishing.

CLAMPING MECHANISM... Large hollow workpiece is secured at each machining station by a tunnel-type hydraulic equalizing clamping fixture. This eliminates the distortion usually encountered when clamping this type of workpiece.

If you have problems that require special machinery—contact your Kearney & Trecker representative.

Capacity . . . Experience . . . Performance

Upon completion of this $5,200,000 expansion of our Special Machinery Division, we offer you (1) unmatched facilities, (2) experience based upon more than 50 years in the design and production of special machinery, and (3) performance, best recommended by our outstanding record of successfully solving many hundreds of unusual machining problems.

For more details on this machine . . . ask for *Data Sheet No. 1002.* Free booklet, "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking. *Write today to* SPECIAL MACHINERY DIVISION, KEARNEY & TRECKER CORP., 6784 West National Ave., Milwaukee 14, Wisconsin.

KEARNEY & TRECKER CORP. · *Special Machinery Division*

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Red Shield says:

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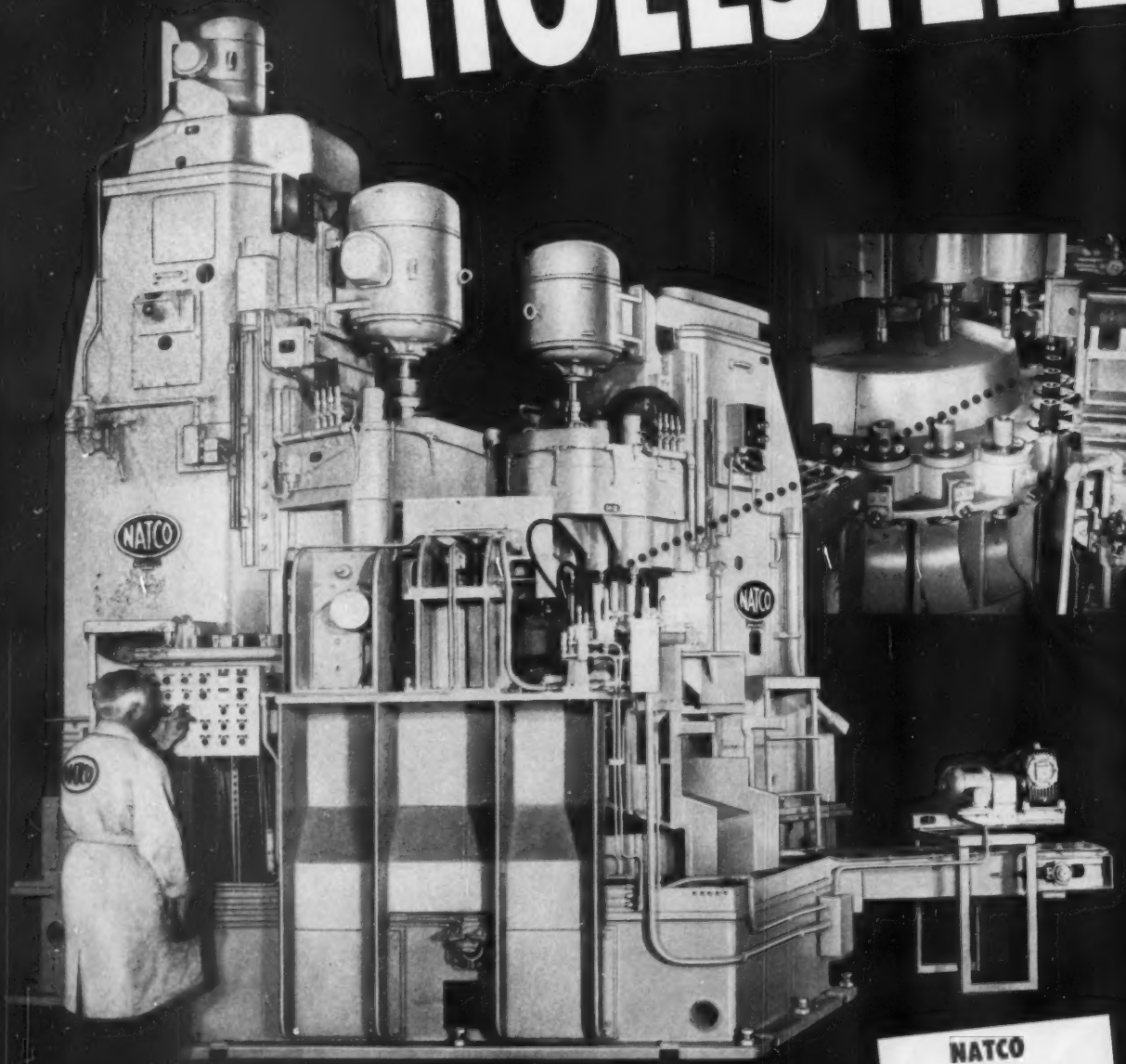
FACTORY BRANCHES IN: NEW YORK • DETROIT • CHICAGO • DALLAS • SAN FRANCISCO

THE STANDARD LINE: *Twist Drills · Reamers · Taps · Dies · Milling Cutters · End Mills · Hobs · Counterbores · Special Tools*

NEW NATCO HOLESTEEL



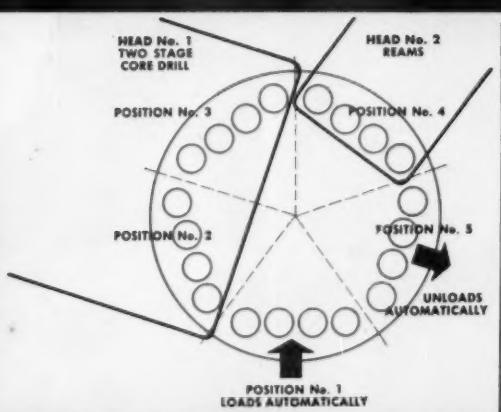
. . . THIS IS ANOTHER MACHINE

NATCO ENGINEERED
for quality and quantity production

CUTS TRACK LINK BUSHING COSTS!

AUTOMATICALLY CORE DRILLS and REAMS SIX DIFFERENT SIZES UP TO...

400 PARTS per HOUR!



FIVE POSITION INDEXING TABLE WITH 20 CHUCKS, AUTOMATIC LOAD and UNLOAD

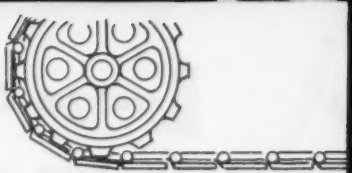
POSITION No. 1
Automatically loads four bushings . . .

POSITION No. 2
Core drills halfway through . . .

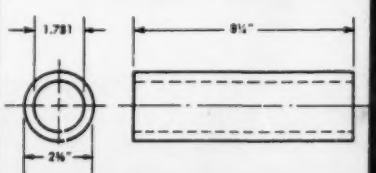
POSITION No. 3
Core drills through . . .

POSITION No. 4
Reams through to size . . .

POSITION No. 5
Automatically unloads four bushings.



TRACK LINK BUSHING



This new NATCO HOLESTEEL automatic indexing machine core drills and reams six different size bushings ranging from 5" to 8¼" in length, 2⅛" to 2⅜" O.D. and 1.4375" to 1.781" I.D. at the rate of from 270 to 400 per hour estimated gross production. The production depends upon the size bushing being run. Estimated gross production is based on 85% of maximum capacity. The stock from which these parts are made is seamless steel tubing and approximately 1/16" of stock is removed in this core drilling and reaming operation.

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping.

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

CHICAGO, 2009 Engineering Bldg. • DETROIT, 10138 W. McNichols Rd.
BUFFALO, 1807 Elmwood Ave. • NEW YORK, 35 Beechwood Ave., Mount Vernon

Mr. and Master Mechanics

This is Dad's special day . . . Family Open House at Lodge & Shipley . . . time when he can show off to his youngster. Perhaps making lathes doesn't seem as thrilling now to the boy as being a baseball star, but Son's impressed with the "wonderful" lathes . . . and Dad's beaming.

The youngster is like the thousands of Lodge & Shipley lathe users who for decades have been impressed by the results of craftsmanship like his Dad's. They translate the boy's words of wonder into more specific terms like "time savings and cost cutting." They see in the intricate Lodge & Shipley headstock, with its 599 precision parts, workmanship that won't make headlines . . . but will help in the struggle against ever-rising costs.

Why not let us send you a file of case histories and other information on more profitable production with Lodge & Shipley Lathes.

Just write The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

Lodge & Shipley

. . . . your **LODGE**-*ical choice!*

no charge for the hole

You wouldn't think of making a cruller and then punching out a hole to create a doughnut. But for years manufacturers have been taking solid rounds of steel and drilling out the centers to make ring-shaped or hollowed-out metal parts.

Now that wasteful practice is being eliminated. Thousands of metal working plants are using Crucible hollow bars . . . available in any of Crucible's famous tool steel grades. From Crucible warehouses conveniently located throughout the country you can get immediate delivery of KETOS oil hardening, SANDERSON water hardening, AIRDI 150 high carbon—high chromium, AIRKOOL air hardening, and NU DIE V hot work tool steels in hollow form . . . and in a wide range of O.D. and I.D. combinations.

Crucible hollow tool steel bars are supplied machine finished inside and outside . . . and cut to the length you require. You eliminate drilling, boring and rough facing operations, cut production time, and step up machine capacity when you use Crucible hollow tool steel bars.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking

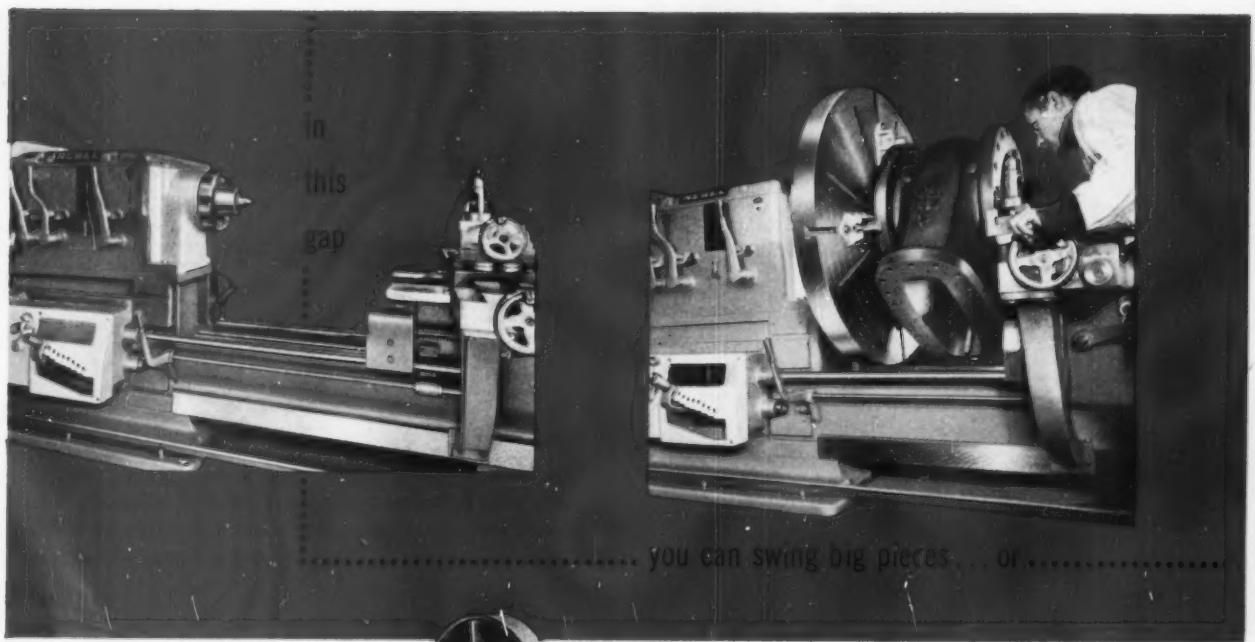
HOLLOW TOOL STEEL

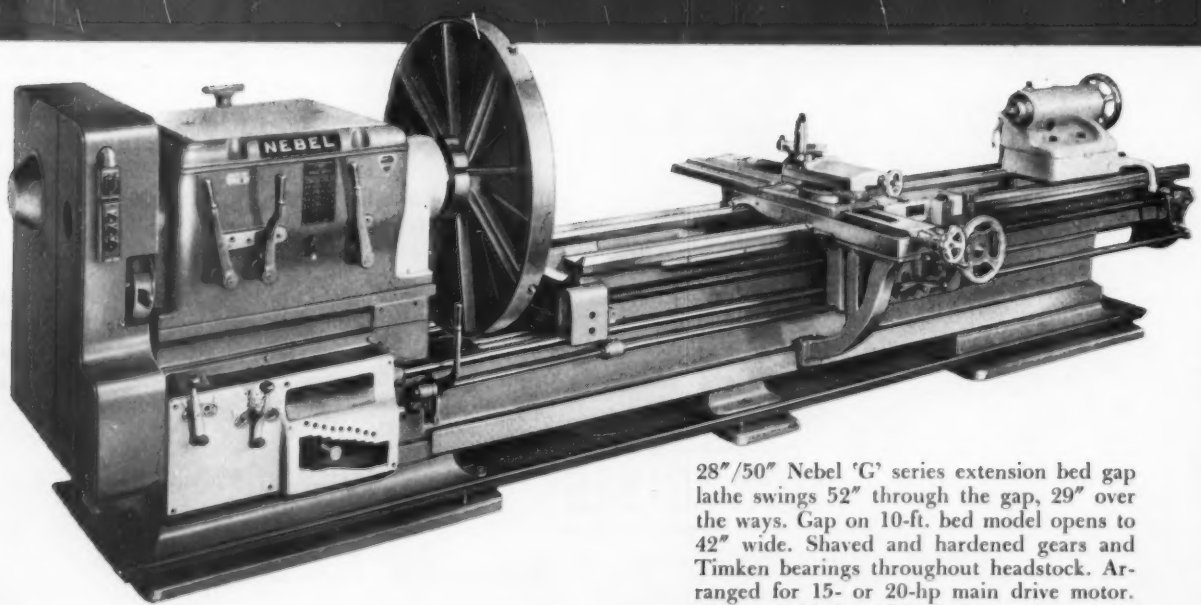
CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

DOUBLE DUTY →

NEBEL

Swing the big, odd-shaped jobs....





28″/50″ Nebel 'G' series extension bed gap lathe swings 52″ through the gap, 29″ over the ways. Gap on 10-ft. bed model opens to 42″ wide. Shaved and hardened gears and Timken bearings throughout headstock. Arranged for 15- or 20-hp main drive motor. Also available in 20″/40″ 'AG' series.

GAP LATHES

...and your engine lathe work besides

Accessories and attachments are available to augment the productive capacity of the standard Nebel gap lathes: power rapid traverse, replaceable hardened steel carriage way inserts, hydraulic duplicating attachment, air operated equipment, variable speed drive, dynabrake motor and others.

The huge valve shown in the photo on the opposite page is representative of the hard-to-handle work that Nebel extension bed gap lathes make easy-to-handle. Thanks to the wide, deep gap, these double duty lathes are saving countless hours in handling time alone . . . both on production and maintenance assignments.

And look for a big surprise on actual running time, too. Because these Nebel giants, although they're built big for big work, are right there when it comes to delivering speed and power.

The secret of Nebel performance is in the headstock. The husky, wide-faced gears are shaved and hardened. They're mounted on short, splined shafts which are supported on Timken anti-friction bearings. The drive gears are cut helical. Add to this Nebel's foolproof lubrication system, and you have a headstock that's a virtual dynamo of metalcutting energy.

It takes a powerful, well built headstock like Nebel's to turn heavy chucking jobs with accuracy.

The remarkable Nebel extension bed gap lathes—in 20″/40″ and 28″/50″ sizes—are gaining wide recognition in the jet engine program and other metalworking activities where accuracy* and efficient performance are essential. In many cases they are used for the same identical work as lathes costing many thousands of dollars more. You'll be time and money ahead to check Nebel before you buy. Why not send today for descriptive literature? The Nebel Machine Tool Co., Cincinnati 25, Ohio, U. S. A.

★ **Engine**

★ **Removable block gap**

★ **Extension bed gap**

Nebel
LATHES
CINCINNATI

The Nebel Machine Tool Co.
3407 Central Parkway
Cincinnati 25, Ohio

☐ *Send current Nebel test data compared with American Standards

☐ Send 20″/40″ 'AG' series extension bed gap bulletin.

☐ Send 28″/50″ 'G' series extension bed gap bulletin

Name .....

Address .....

City ..... Zone ..... State .....

THREE BROACH USERS TELL WHY

INDUSTRIAL POWER . . .

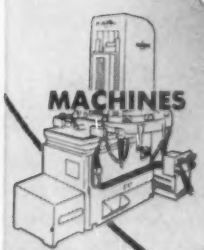
. . . "We like Colonial broaches because of their accuracy, dependability, and service rendered by the company and their representatives . . ."

ELECTRONICS . . .

. . . "It has been our experience that Colonial broaches have given us most satisfactory results. Quality, workmanship and tolerances furnished on these broaches are a definite asset to our company . . ."

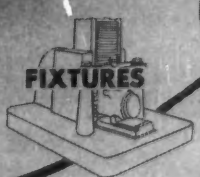
COAL MINING EQUIPMENT . . .

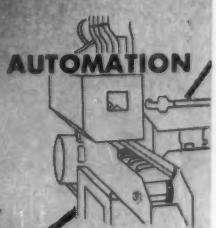
. . . "We are well satisfied with the performance of Colonial broaches in regard to tool life, low maintenance, and close tolerances, which they must hold. A big factor is that in the event of a rush or a break-down job, we have learned to depend on Colonial getting broaches to us very quickly, thus avoiding long shutdowns . ."

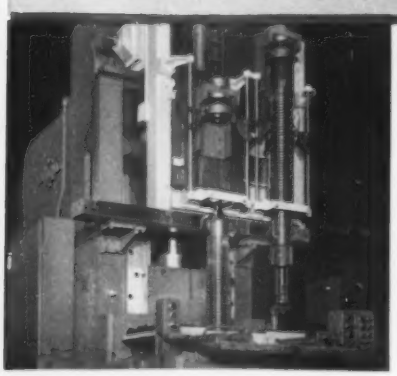


COLONIAL
BROACH CO. DETROIT 13

Unified Broaching







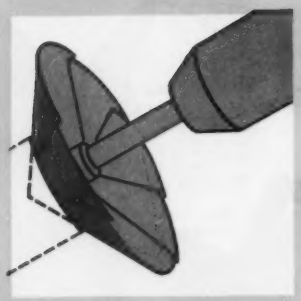
NO BROACH HANDLING - ½ *the Work Handling*

A big gain in efficiency as well as a reduction in cost results when there is no broach handling between passes in the two-step broaching of large parts. The Colonial dual sliding broach handling support handles the two broaches automatically and permits two-pass broaching with only one handling of the work piece.

The entire cycle through both broaching passes is automatic on this Colonial 50-ton, 72-inch stroke, pull-down broaching machine.

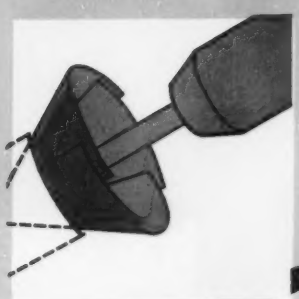
This is a Colonial Unified Broaching Installation.

Saved minutes add up...



SLICK TRICK-

for radiusing the edge of a hole. On a portable tool, the "wings" of a METALITE Cloth Slotted Disc are thrown out flat by centrifugal force, but gradually fold in as the disc is pushed into the hole. You can see why it does a neat, quick, uniform job.

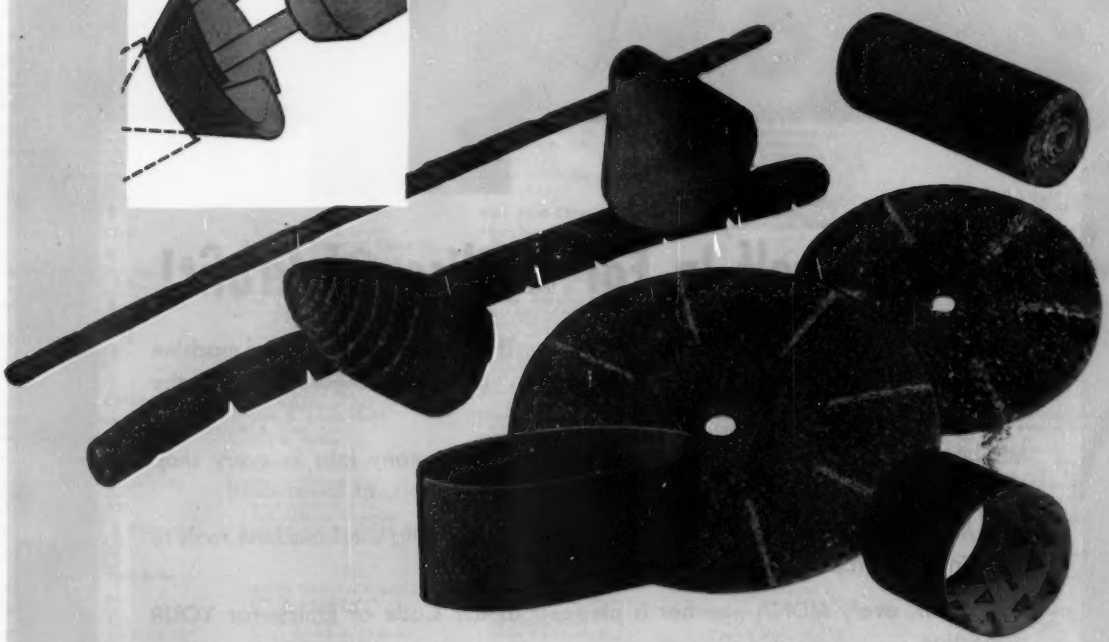


when you use these BEHR-MANNING ABRASIVE TOOLS

Take for instance, radiusing or deburring the edge of a hole. See (at left) how beautifully simple it is with a METALITE® Cloth Slotted Disc. You get the same time-saving result on any number of tricky jobs, with the many specially designed BEHR-MANNING® abrasive tools. They enable you to quickly finish all kinds of edges, contours, recesses, inside surfaces. Look over your operations and replace slow, clumsy hand methods with time-saving abrasive tools. The booklet, "Blueprints for Production," will help you. Write Behr-Manning Corp., Troy, N. Y., for your copy. Address Dept. AM-3.

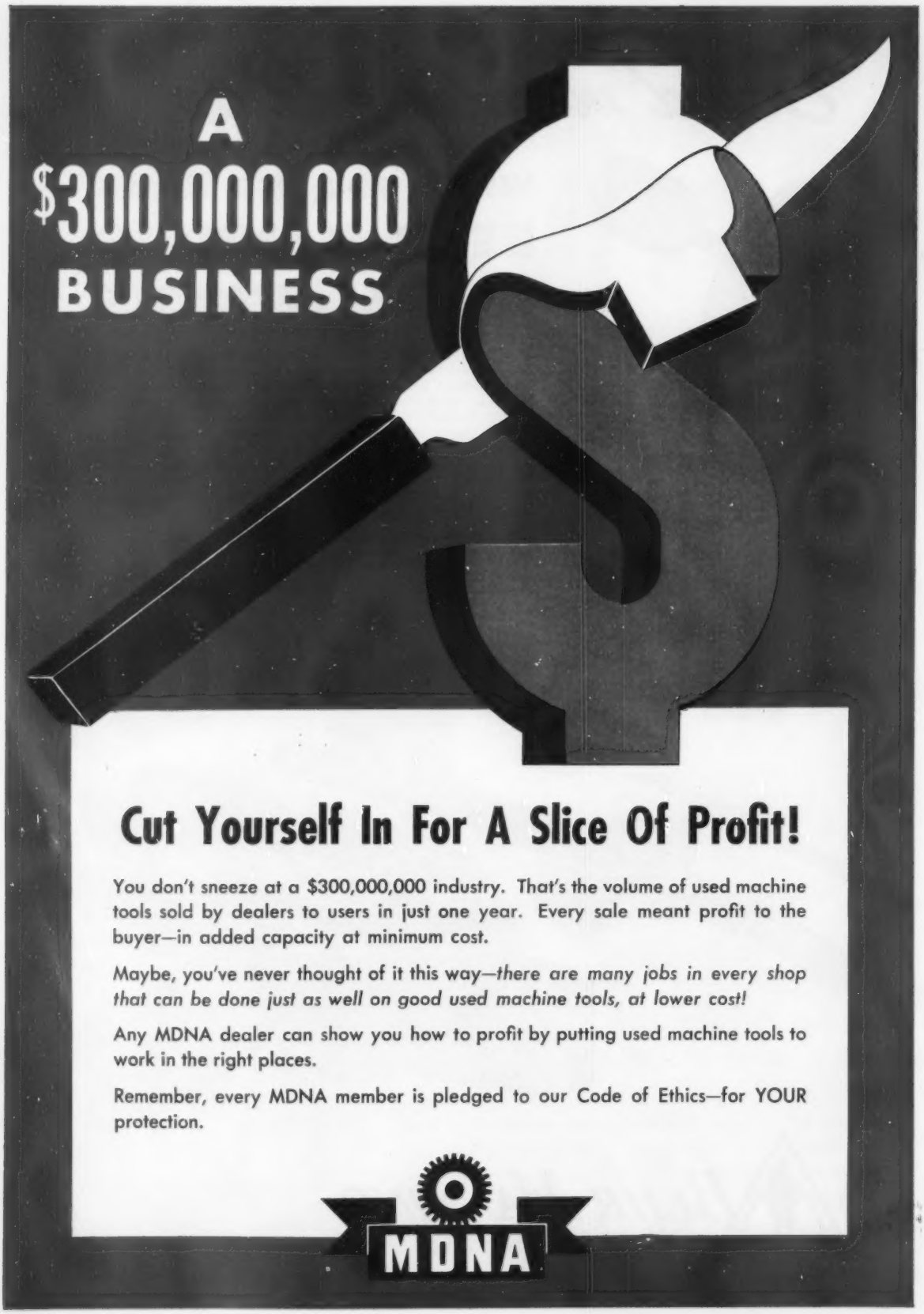
In Canada: Behr-Manning (Canada) Ltd., Brantford
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U.S.A.

G-3



BEHR-MANNING® CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES



Cut Yourself In For A Slice Of Profit!

You don't sneeze at a $300,000,000 industry. That's the volume of used machine tools sold by dealers to users in just one year. Every sale meant profit to the buyer—in added capacity at minimum cost.

Maybe, you've never thought of it this way—*there are many jobs in every shop that can be done just as well on good used machine tools, at lower cost!*

Any MDNA dealer can show you how to profit by putting used machine tools to work in the right places.

Remember, every MDNA member is pledged to our Code of Ethics—for YOUR protection.

MDNA

MDNA MEMBERS

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MAKE *NEW*
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We Invite You To Add These Names to Your Mailing List As Repsonsible Buyers and Suppliers of Machine Tools

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precision

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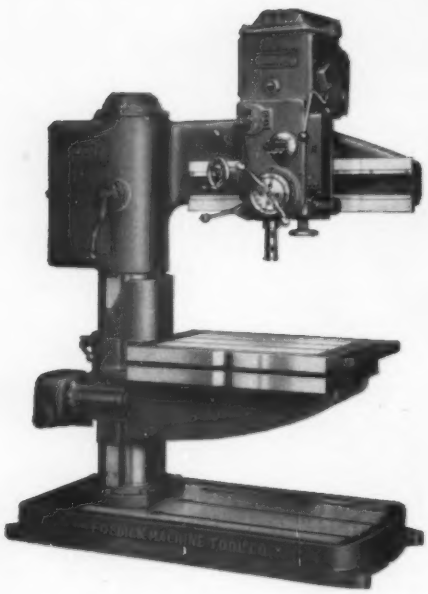


SENSITIVE RADIAL DRILL

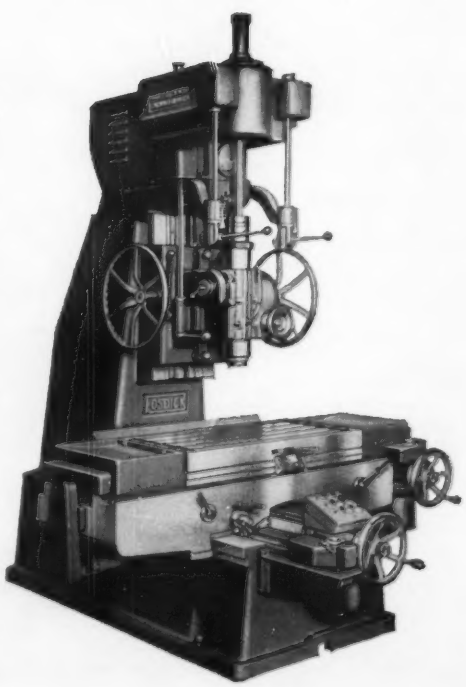
Exclusive with Fosdick, the Sensitive Radial combines upright and sensitive features—rigidity, compactness and convenient table height—with the capacity and flexibility of a radial. Table is universally adjustable, arm rotates at constant height and controls are always within convenient reach. One piece column, 3 and 4 ft. arms. Drills up to 1¼ ".

JIG BORER and AUTOMATIC POSITIONING MACHINE

Jig boring with automatic positioning has eliminated the need for highly-skilled labor for precision hole positioning! With duplicating bars—made quickly, stored easily—the ordinary operator can position table and slide at the same time to within plus or minus .0001" *at the touch of a button!* And Fosdick's Jig Borer costs less than any comparable machine on the market.

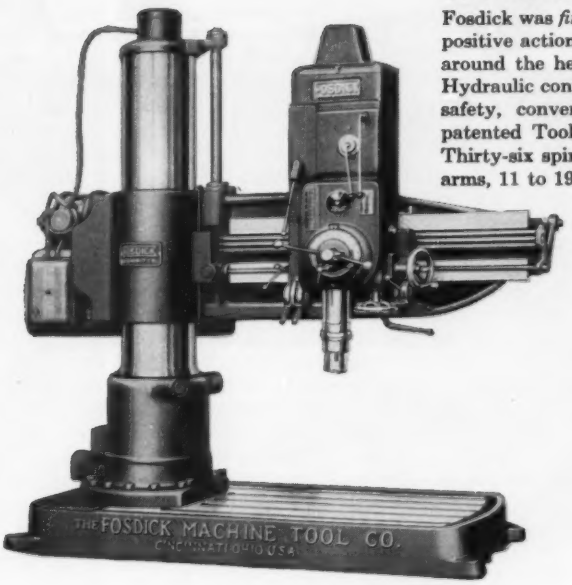
Duplicating drilled, bored and tapped parts—*weeks, months* or *years* apart—is fast, economical with Fosdick's Automatic Positioning machine. Set up time measured in minutes! Costly jigs are replaced by compact duplicating bars made of standard ⅝" stock, bored for each hole.

Table sizes: 18"x36" (no automatic positioning) and 22"x44". Table to spindle capacity, 27". 3 hp motor standard, 5 or 7½ hp optional.



ECONOMAX HYDRAULIC RADIAL DRILL

Fosdick was *first* to use hydraulics in a radial for smooth, positive action, easy operation. Controls are grouped around the head for maximum operator efficiency. Hydraulic controls and clamps are interlocked for safety, convenience. Standard equipment includes patented Tool Ejector and built-in fluorescent tube. Thirty-six spindle speeds, eighteen feeds. 3 to 8 ft. arms, 11 to 19 inch columns.

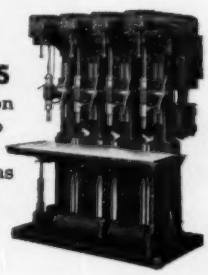


UPRIGHT DRILL

Two sizes, 25″ and 30″ with either round or box columns. Twelve spindle speeds from 60 to 1500 rpm, nine power feeds from .005″ to .043″ per revolution.

SENSITIVE DRILLS

For economical production of small drilled parts. 1 to 6 spindles in either six or nine speeds from as low as 55 rpm to as high as 3600 rpm, four power feeds.



Mail this coupon today!

FOSDICK

The Fosdick Machine Tool Co., Dept. A, Cincinnati 23

Please send descriptive bulletins for the following machines:

- ☐ *Sensitive Radial*
- ☐ *Economax Radial*
- ☐ *Jig Borer*
- ☐ *Automatic Positioning Machine*
- ☐ *Sensitive Drill*
- ☐ *Upright Drill*

Company _____

Address _____

_____

Individual _____

Title _____

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

Keep Your on the OLIVER Line — Cost Cutting Production Boosting MACHINE TOOLS

OLIVER DRILL POINTERS

Properly machine ground drills give better performance. OLIVER Drill Pointers, with each lip doing equal work, give balanced cuts—more accuracy = more perfect holes — more efficiency = longer drill life.

As Illustrated:

No. 21 Oliver Bench Drill Grinder. Hand operated for Drills No. 57 to ½".

No. 510. For Drills, ¼ to 3 — 2-3-4 flute.

OLIVER DIE MAKING MACHINES

Efficient, speedy and accurate — effecting great savings in time and costs. Skilled labor is not required for sawing, filing and lapping operations.

Available in 5 Models.

Bench Model S-1 (Illustrated) — Single Speed Die Maker for use on Tool Steel up to 1" Thick.

Heavy Duty Model (Illustrated) — 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

OLIVER ACE UNIVERSAL TOOL & CUTTER GRINDERS

Keep your most difficult cutters sharp with Oliver ACES. They excel on high speed and Tungsten-Carbide work. Direct reading for clearances reduces fatigue — eases operators' jobs.

The ACE excels for grinding face mills up to 15" —also, slab mills • slitting saws • all types cutters and reamers.

2 Models: Heavy Duty (Illustrated) and Standard.

OLIVER 20" TEMPLATE TOOL BIT GRINDER

Efficiently powered by a 3 h.p. motor, this OLIVER Machine grinds on the periphery of a 20" wheel. Capacity: tools up to 1½" wide x 1¾" high from 0 to 20° clearance. The OLIVER is developed for production sharpening of single point Tungsten-Carbide and high speed tools—offers increased production, lower tool costs and savings in man-hours. Extremely fine finish assured.

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Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Philadelphia Story

I don't blame Mr Joe Redding (*AM*—Jan 18 '54, p100) for being critical of my statement that a man would rather have that feeling of importance than a raise in pay. We all want the same things in life, such as health, security, money, and the things money will buy. But there is one other—the craving to be appreciated. It is a human hunger, and people will make many sacrifices to gain recognition.

Many years ago, I worked for what was then a fine company. When the works manager passed on, a new man was appointed who believed in old-fashioned, whip-cracking methods. With his lack of tact and understanding he created resentment and discord, and was eventually fired. We then had a succession of managers who had never heard of working under a system of approval, although each introduced new policies and methods. I was drawing $100 a week as a supervisor, but I quit the job for one paying only $80.

My new company used encouragement, appreciation, cooperation, and recognition of a job well done. It believed in cooperation from the top down, as well as from the bottom up, including sideways cooperation between departments. Although it took me four years to reach a comparable salary, they were happy years, and I would do the same thing again under similar circumstances.

Doing the kind of work you like to do, and for a good company, is more important than a few dollars difference in pay. I have no time for the mollycoddler, but I have less time and respect for the hard-boiled top brass who thinks he can make people jump by throwing his weight around. I am sure Mr Redding would not work for that kind of management. Incidentally, I don't have to defend Philadelphia; its record speaks for itself.

A E Salmons
Philadelphia

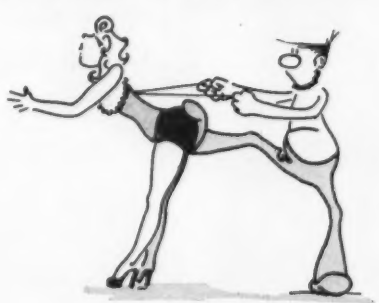
Carbide Function

In a recent issue (*AM*—Mid-Nov '53, p C7) you stated, "Carbide tools have but one essential reason for being; longer tool life. No matter what the application may be . . . that is the purpose."

According to our engineers, longer

GRINETICS

BY D G SMITH



SHRINK FIT

INDUSTRIAL TAPE

MARKING TOOL

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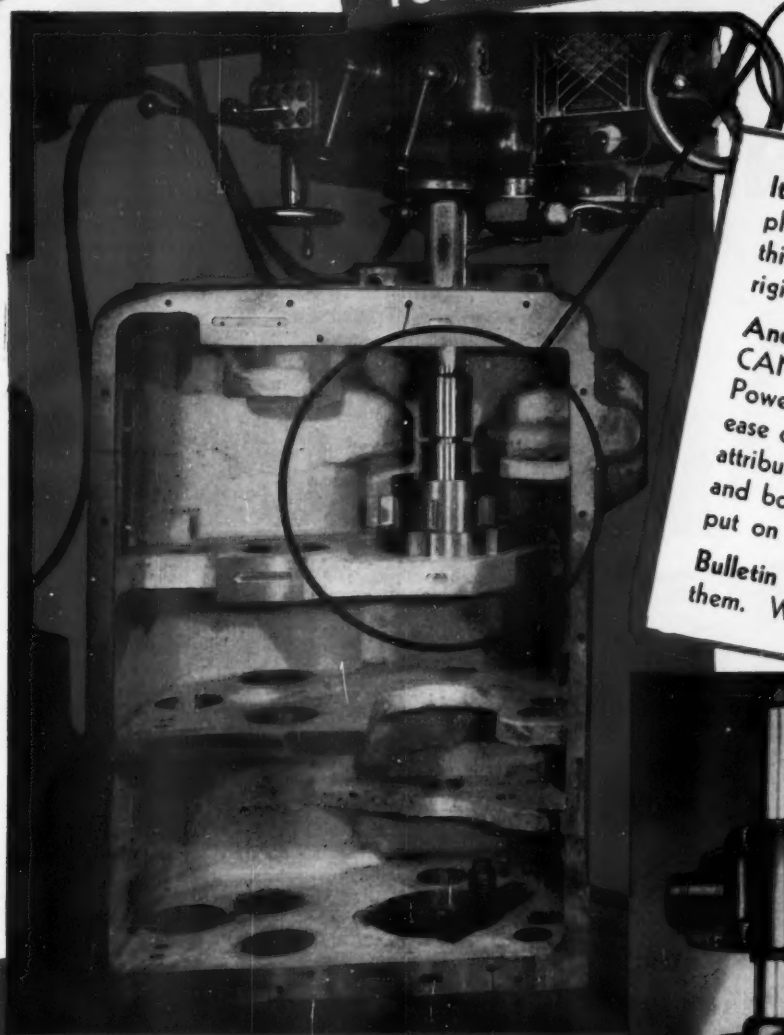
A GOOD SPINDLE

FOR GOOD BORING AND TAPPING . . .

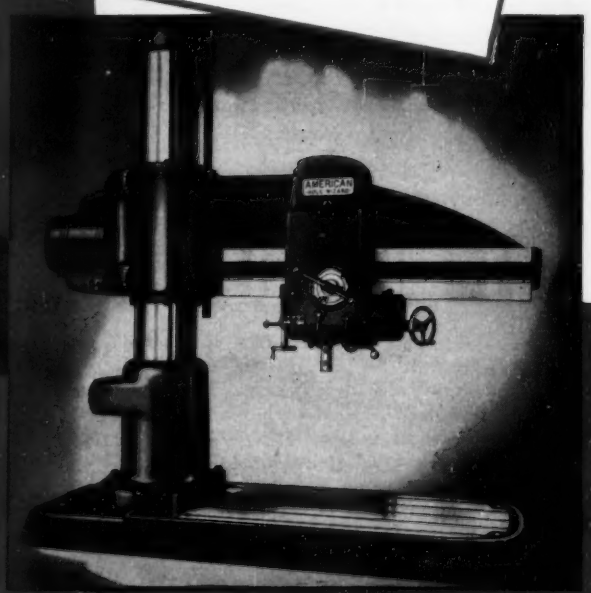


Here's a 10" tapping job on a 5-foot "AMERICAN" Hole Wizard Radial

It takes a sturdy, rigid machine with plenty of power to do work like this. Especially does it require a rigid and smooth-acting spindle.

And that's exactly what "AMERICAN" Hole Wizards are noted for. Power—rigidity—convenience and ease of control are "AMERICAN" attributes that cut drilling, tapping and boring costs wherever they are put on the job.

Bulletin No. 327 tells all about them. Want one?



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Lathes and Radial Drills

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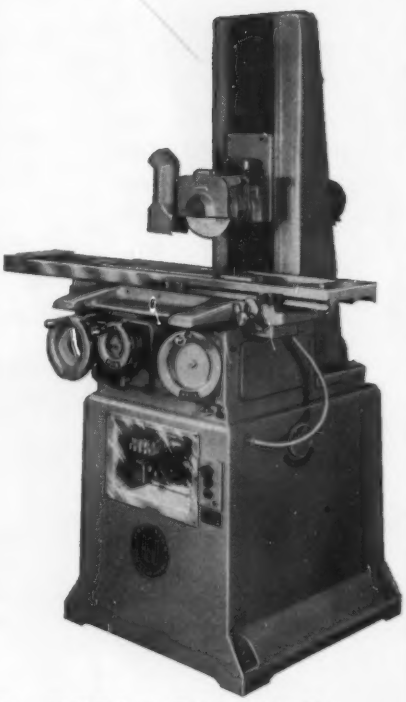
Finger-tip level controls for easier operation; one-piece column casting mounted *on* the base for maximum rigidity; hand-scraped ways for accuracy; telescoping dust plates for protection of vertical and cross feed mechanisms — these are but a few of the many improvements designed by our engineers to make Reid Grinders a standard of precision and dependability.

If your toolroom still harbors a surface grinder like those above, for the sake of efficiency,



PLAN NOW FOR REPLACEMENT!

Condensed specifications — Model 618V
Capacity: 6" x 18" x 17¼" (spindle center to table)
Work table: 51" x 8"
Power-feed table: variable, 12 to 35 ft./min.
Standard wheel: 7" x ½" x 1¼"
Weight: 2100 lbs. Floor space: 71" x 43½"

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Please request Catalog 618-1

Reid Brothers Company, Inc.

BEVERLY, MASSACHUSETTS

tool life is not the only essential reason for existing. Carbides do provide longer tool life but, more important, they provide more production per tool for a given unit of time. They are capable of working at much higher speeds to produce 4 to 8 times more work, even though tool life may be the same as HSS producing one unit of work.

This is particularly true in reamers where, in hours of use, carbide and HSS might have about the same stamina but, in work produced, carbide will outperform as high as 10 to 1.

Jay DeEulis
Carboloy Dep't
General Electric Co

Your engineers are right, of course. You can usually get long tool life if you are willing to sacrifice everything else for it, but higher output is something else again.—Ed.

Up To Date

You strike a very pertinent note (*AM*—Nov 23 '53, p135) on a problem that confronts every metalworking manufacturer; the problem of keeping tool drawings up to date.

The firm with which I was associated tackled the problem in this manner: A very close liaison was established between the drawing office, toolroom, and manufacturing section. All tool draftsmen were drawn from the toolroom, from apprentices who had finished their time. During their apprenticeship, they spent part of their time in the drawing office, thus enabling the chief draftsman to somewhat assess the possibility of a transfer to the drawing office at a later date. The drawing office was placed right alongside the toolroom, and there was free access to both draftsmen and toolmakers to consult when problems arose. Tool drawings in the rough were submitted to the engineers in charge of toolroom and manufacturing sections, and not until all agreed was the order issued for making the tools.

During manufacture, if the engineer in charge could find a good reason for the alteration of any tool-

ing, the drawing office would collaborate in every way and alter drawings accordingly. By these means we kept our tool drawings 95% correct. If there should be any friction between these various offices, then the plans devised for keeping tool drawings up to date will not work.

I would be glad to see some discussion on this very important, but often overlooked, matter.

Jack Finlay
Mt Victoria, NSW, Australia

Do any other readers have ideas on this vital subject? We would welcome letters from them.—Ed.

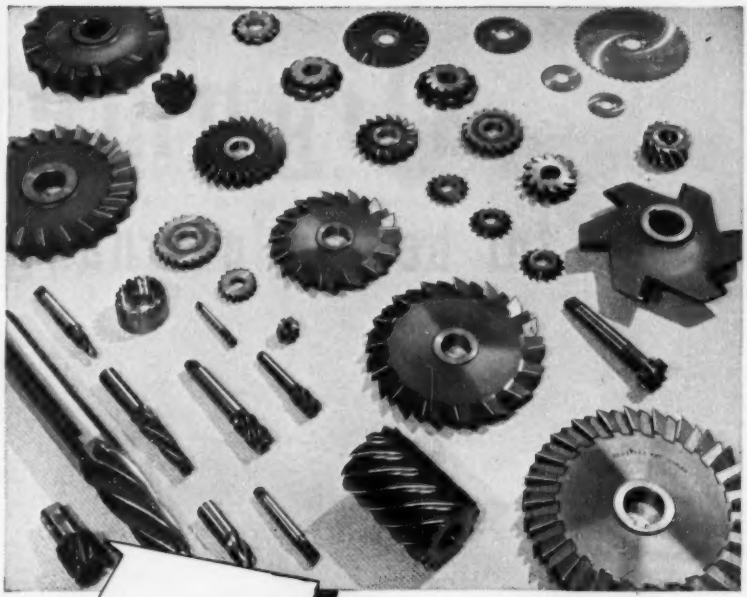
Tool Designer's Lament

The poem by S F Perkins, Jr, entitled, "The Draftsman" (*AM*—Oct 26 '53, p123), whilst entertaining, shows only one side of a draughtsman's life, and a mechanical draughtsman at that.

I am enclosing, therefore, another poem, author unknown, which will, I am sure, strike a respondent chord in the hearts of all tool draughtsmen.

P V Dunn
Johannesburg, South Africa

Jig and tool draughtsmen? Scum of the earth,
Daily regretting the day of their birth,
Sweating and toiling the masses to please,
Begging for pencils on bended knees.
Weary, dejected, sickened at heart,
Facing derision right from the start;
Treated as aliens, outcasts, or worse,
Greeted with sneers, or a soft muttered curse,
Everyone's servant; 'twixt devil and deep.
Legion of heroes, every darned one,
Fighting the know-alls until day is done.
Knowing no respite, asking no rest,
Prospect of failure in each manly breast.
Who shall uplift and give them their place?
Guts of the industry—pride of their race.
Laud them ye poets, sing of their fame,
Praise their devotion for playing the game.
Leave no stone unturned all men should know
A draughtsman's life is just touch and go.
And lastly, Directors, take heed of their cries,
For your sakes and theirs—Give Them a Rise.
Old English — Traditional.



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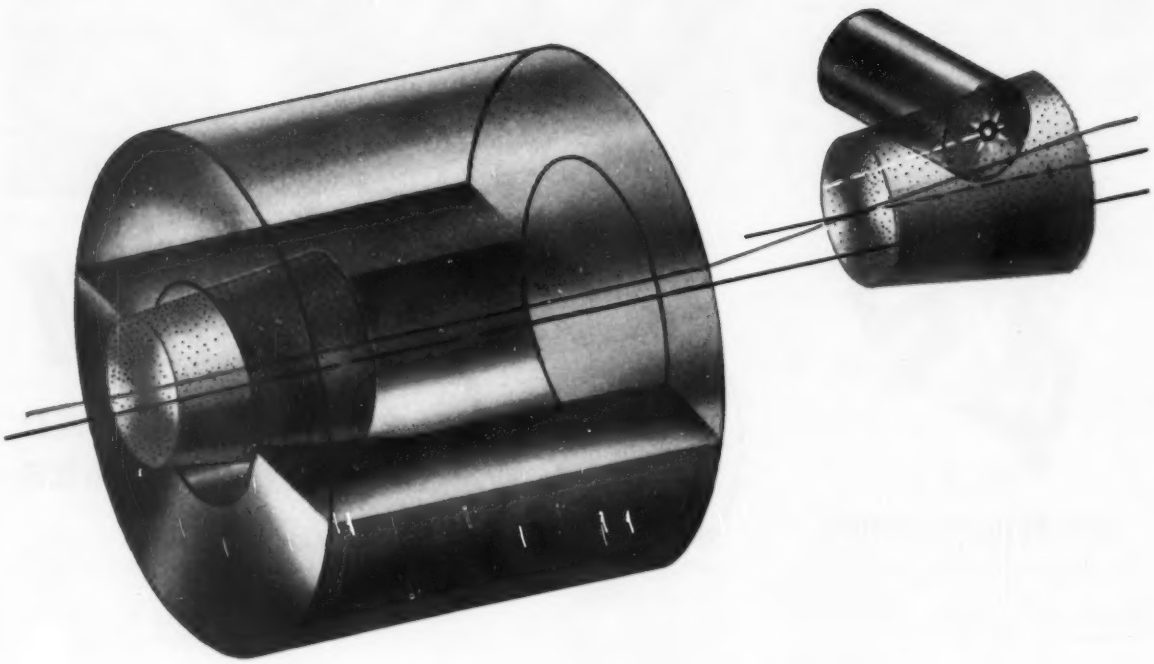
alignment

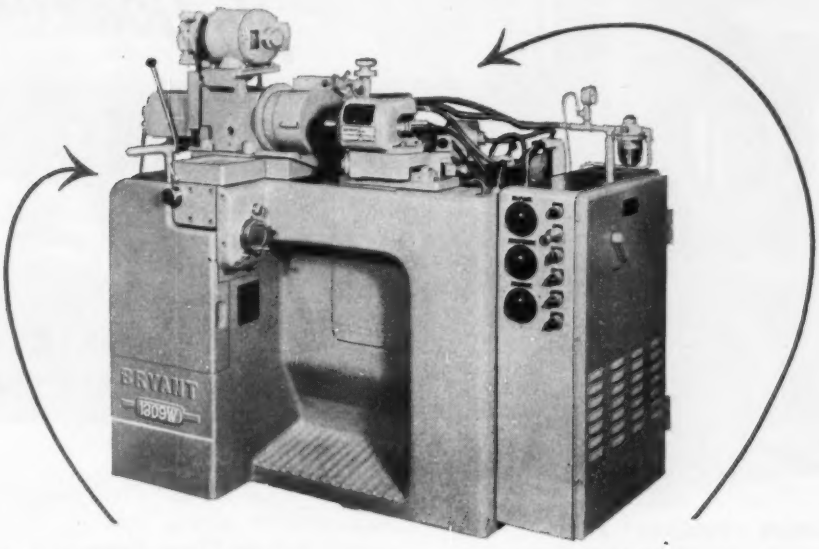
for better internal grinding



IT is common assumption in internal grinding that once the grinding wheel passes the diamond, all errors will be eliminated and the wheel will be a perfect cylinder. It is also assumed that this grinding wheel can produce a straight hole. These two assumptions are true if the wheel path is a straight line parallel with the axis of the wheel as it passes the diamond and traverses the work.

In the illustration, the wheel slides are badly worn and the wheel path is not a straight line. The distortion in the ways causes the wheel to move gradually away from the diamond and the wheel is dressed to a taper as it passes the diamond. Then, as the tapered wheel traverses the work, it will grind only on its large diameter. At the point of reversal the tapered form will be transferred to the work. If the traverse stroke is lengthened, the tapered section will be moved to the new point of reversal. In addition, wheel wear will be excessive, finish will be poor, feed lines may be visible.

Available information advises simply turning the workhead or changing the length of traverse to correct taper. In the case illustrated, neither turning the workhead nor changing the length of traverse will produce a straight hole. The only possible remedy is to straighten the wheel slide ways which will, in turn, straighten the wheel path. The wheel will then contact the work properly, producing correct geometry of the hole, longer wheel life and better finish.



Left end of workhead may be raised or lowered to bring its axis into a plane parallel with the wheel path.

Rear of wheelslide may be adjusted to insure straight line motion of the wheel.

The No. 1309-W internal grinder is for precision, production grinding of two bores and a taper at one chucking where size, concentricity and surface finish are of utmost importance. Although intended primarily for bore diameters from 1/16" to 1/2", it has a chuck swing of 9" and a maximum grinding stroke of 3 1/2". Two wheelheads are used and the work is indexed from one to the other. The wheelheads are mounted on an auxiliary angular slide for traverse grinding the taper. Preloaded ball slides on both the longitudinal and cross slides and the auxiliary angular slide assure the sensitive control necessary for grinding small bores to close tolerances. Write for folder.

Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie — free showings arranged for engineering groups.

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Internal Grinders • Boring Machines • Internal & External Thread Gages • Granite Surface Plates

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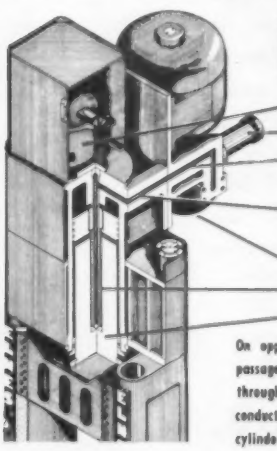
HIGH-SPEED "PIPELESS" PRESS with two reversible pumps

450-Ton Elmes Single-Action Metal Drawing & Forming Press, with many special features including the revolutionary Elmes Pipeless construction. This press employs two reversible pumps, providing the following operating speeds per minute: advance—550″, press—126″, return—550″.



SECTIONAL VIEW SHOWING ELMES PIPELESS CONSTRUCTION

- Prefill valve.
- Pump Shifting cylinder.
- Passage through pump bracket for pull-back fluid.
- Passage through cylinder for pull-back fluid.
- Pump.
- Pull-back tube.
- Main Ram.

On opposite side of the press there are passages similar to the passages shown through pump bracket and cylinder, which conduct the pressure fluid to the main cylinder area.

This exclusive Elmes® Press design has put an end to high-pressure piping troubles. The main hydraulic circuit in these Elmes Presses *has no piping!* The advantages of this unique pipeless construction, proved by wide-spread use throughout industry over an extensive period, assure *a radical reduction in maintenance cost, with virtual elimination of downtime.*

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SPOT NEWS of Metalworking

- **Large companies' policy of making tool shops out of their maintenance shops** as a means of offsetting production cutbacks is starving the contract tool and die industry and crippling US industrial defense strength, says H C Murrer, president, National Tool & Die Mfrs Assn, who adds "If we do not support the tool and die industry in peacetime, it will not be ready in wartime."

- **One auto manufacturer is narrowing its suppliers to one for each item** used in its cars — claims it will save $10 per car by cutting down paperwork, red tape.

- **Belgium is making a strong bid for "South of the Border" trade.** Dealers at the recent Belgian Trade Fair in Mexico City offered extremely liberal credit to Mexican industrialists for purchase of Belgian-made heavy machinery.

An Index of New Orders for Machinery, except electrical, the first of its kind, has been announced by the McGraw-Hill Department of Economics. It takes 1950 as a base, measures orders in dollar volume monthly. The chart and figures are published for the first time on pages 178-79.

- **Japan's Hitachi Shipbuilding will export 11 ships to Russia** (one 5000-ton freighter, four 200-ton tugboats, six 330-ton fishing boats — total value $5 million) in exchange for coal, manganese and chromium ore, asbestos and lumber.

- **Kaiser Aluminum & Chemical may build a $70-million aluminum sheet mill at Cleveland,** is considering several possible sites in and around that city.

- **Electroforming of molybdenum shapes** may soon be an offshoot of a new process for preparing molybdenum by electrolysis, now being developed for Army Ordnance.

Union officials are reported to have asked a Midwestern metalworking company to cut its present work force in order to give five days of employment, instead of the present three or four, to those retained. The let-out workers could get unemployment insurance, the union points out.

- **Laid-off second and third shift foremen were turned down for union membership** when they became workers in the ranks when their shifts were discontinued at an Ohio firm.

- **Some 30 Cleveland-area Ordnance contracts will be cancelled and re-bid this month** as a result of Army Ordnance's $1-billion-a-year budget cutbacks starting next July. Already cancelled: four major shell contracts.

- **A certification-mark plan for guaranteeing reliability of castings** has been put into effect by the British Zinc Alloy Die Casters Assn and the British Standards Institute. Castings from licensed firms will carry the BSI kite mark, the diecaster's name, trademark or BSI license number. Small castings will be supplied in specially-labeled boxes.

- **Pure beryllium, now with greatly improved ductility, may find many new uses** in making special parts for aircraft, ordnance and instruments, where great strength, light weight and corrosion resistance are required.

- **Even unskilled workers can unscramble mixed-up bar stock and parts** in warehouses and storage areas with the aid of GM Research Laboratories' new thermoelectric metal comparator—a reclassifying device that can also substitute for chemical, spectographic, magnetic and spark analysis.

Grinding 5-Start Worm with 4" Lead

STANDARD STYLE 36

EX-CELL-O *Precision* THREAD GRINDER

In the photograph at the left the operator is grinding a worm shaft for use in a special machine. The part is about 22" long and the worm is 4½" long, 3.430" O.D., has 5 starts, a pitch of .800", a lead of 4" and a tooth depth of .5454". The worm was ground in two operations on a standard Style 36 Thread Grinder. It was rough ground from the solid, hardened, then finish ground.

For complete information and specifications on the Style 36 and other Ex-Cell-O Thread Grinders contact your local representative or write today to Ex-Cell-O.

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53-35

Washington

Military services have drawn up projects to be financed with the Defense Department's $250 million Vance Plan fund for reserve tools and facilities. The money was voted last year, nothing has been spent this year, and $100 million has been earmarked for expenditure in fiscal 1955.

Cost of the new projects is well over $250 million for machine tools alone. This excludes money for brick and mortar, for which the Pentagon is authorized to spend up to $50 million of the Vance Plan fund. Classified document describing the reserve tool projects is as fat as a telephone directory.

The Pentagon's top-level brass are now going over the projects with a fine tooth comb. There'll be no hasty obligations of funds for reserve tools. Officials are taking the cue from Defense Secretary Wilson, who has long been unenthusiastic about spending money on production lines to be kept idle for an emergency. One high official points out that much of the equipment in the reserve tool projects is for manufacture of end-items that will soon be obsolete. Says he: "We have enough trouble maintaining tools we have now without buying more."

Last year, the military services mapped out $1.2 billion worth of reserve tool projects to be financed with Vance Plan funds, but these were quietly put on the shelf. The new projects may face some more of the same treatment.

• • •

The Administration is pushing plans to take complete Census of Manufactures next year, covering this year's data. This census covers all the nation's manufacturing establishments, includes data on employment, wages, expenditures for materials and equipment, value added by manufacturing, shipments, etc., broken down minutely by industry and geography.

Such a census is important to metalworking industries. It's supposed to be taken every five years. But Washington has fallen behind. Last full-scale census of manufactures was taken in 1948 covering the previous year's data. A new one was authorized to be conducted this year on 1953 data, but Congress failed to vote the money.

New push for the Census of Manufactures — and other regular censuses—comes from a report just made by a nine-man committee of experts, named last year by Commerce Secretary Weeks to appraise his department's census programs. The committee, headed by Ralph J Watkins, Dun and Bradstreet's research director, was unhappy with what it found.

• • •

New truces may be called between warring AFL unions as the result of the National Labor Relations Board decision in the American Potash case. The labor agency holds that AFL craft unions may still carve bargaining units out of organized plants—but only if they are "true" craft units.

This figures to block recurring membership raids. Where one union moves in to pick up new members, it will have to show that it has historically represented the particular craft. The Machinist's union—traditionally a bargainer for "multi?craft" units—lost out in this case when it sought to represent three groups not wearing the Machinist label. So, AFL unions which have previously been granted bargaining rights for varied workers, are expected to pull in their horns on such attempts in the future, knowing they could be knocked down by NLRB.

The Machinists are not morose over the decision, however. Like other AFL craft unions, the IAM likes continuation of the craft severance policy. Management and industrial CIO unions—who feel the effects of the invading AFL crafts—were stung by the board decision, even though it will cut down the number of plant elections.

The moribund "no raiding" pact between the AFL and CIO, conversly, may have been dealt a costly blow by the American Potash decision. AFL craft unions, with the new board clearing the way, may decide they won't be tied up by the pact since they are free to take workers in their crafts away from other unions.

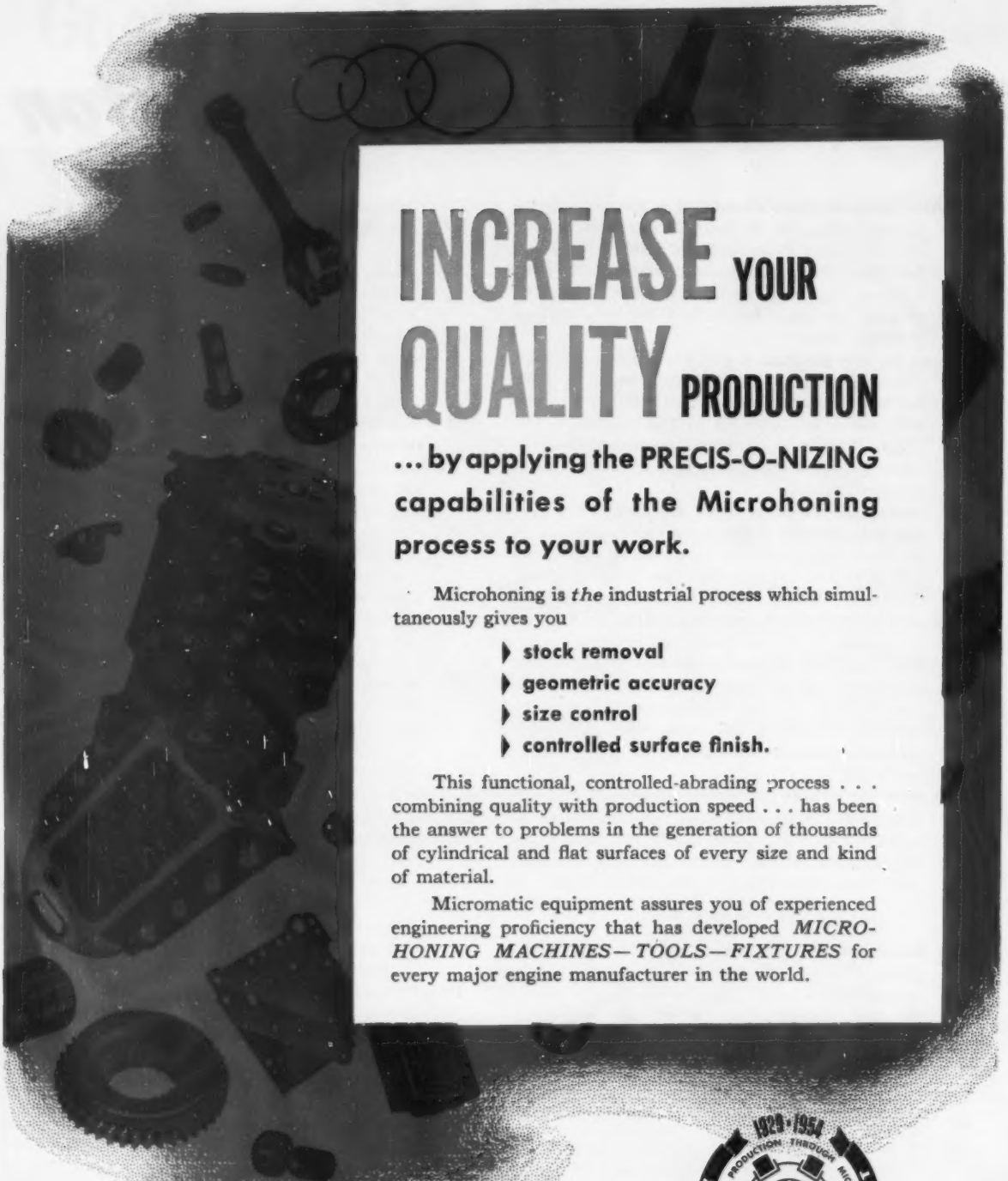
Despite outspoken opposition to the pact by several powerful AFL unions, the IAM still is behind it. Its officials hope to persuade the recalcitrant unions to change their minds and give the agreement a chance to work.

• • •

To clarify business uncertainties regarding progress payments to defense contractors, Defense Secretary Wilson last week set a ceiling of 90% of direct labor and material costs—or, 75% of total costs — of the work done under the undelivered portion of the contract.

"Higher percentages may be found necessary," Wilson declared however, "in individual cases (and these) may be obtained with the specific approval of the head of the procuring activity."

Any adjustment of progress payments on active contracts will be made only after notice to and after full exploration of the contractor's financial condition, credit arrangements, projected case requirements, progress payments, etc.



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Detroit

Chrysler Corp in its annual report said it will strengthen its operating divisions and give them greater autonomy.

This could indicate a new trend on the part of automakers to imbue their divisions with a more competitive spirit—vying with one another as well as with outside firms.

Chrysler hasn't set a timetable for its divisionalization program and hasn't drawn up many of the details so far.

But initially each division will get a comptroller and accounting system of its own. In this way division officers will know their own profits and losses.

And Chrysler, DeSoto and Plymouth stylings may go their separate ways, subject to final approval by the Central Styling section.

• • •

Long-standing rumors that Chrysler is looking for new financing (Am Feb 1/54 p39) were confirmed when Chrysler President L L Colbert announced that a $100-year $250-million dollar loan had been arranged with the Prudential Insurance Co of America

Aside from providing more working capital, Colbert said the loan will finance such productivity improvements as further automation, as well as expansion and modernization projects. The announcement paid particular heed to Chrysler's modernization program, which emphasizes more automation.

No details of completed expansions were announced in the report, but because most of the corporation's production facilities are located in the Detroit area, it is logical to assume other facilities will be put there too.

• • •

Planning for the huge loan apparently jelled quickly. And banking circles say that the time factor probably weighed importantly in Chrysler's decision to acquire working capital the way it did.

Had Chrysler offered stock, SEC and stockholder approval would have been needed. And it couldn't have been obtained in less than three months, more likely six.

• • •

With Buick crowding closely behind, Plymouth is broadening its power package offerings by adopting the Chrysler-developed Powerflite transmission and a Dodge-developed 110-hp engine. The combination makes Plymouth available with fully automatic transmission for the first time.

• • •

Guaranteed Annual Wage is at the top of UAW-CIO's Sixth Educational Conference agenda.

What CIO wants along this line will likely be aired for the first time at the Conference, scheduled for April 8-11 in Chicago.

Automation, too, will come in for consideration by the CIO when the Conference discusses "How Automatic Automation Is."

But don't get the idea CIO is against automation. Walter Reuther has never criticized automation as a "job robber."

• • •

Biggest deterrent to auto air conditioner sales has been the $600 price tag. Now Nash has made the first big dent in the price with a cooling, heating and ventilating package that lists at $395.

That compares with $647 for Packard's unit, $642 for the Chrysler-Dodge-DeSoto unit, $620 for Cadillac's, and $594 for the Buick-Olds-Pontiac units.

And to those prices add $80 or more for heaters. These are included in the Nash unit.

• • •

You can't interpret auto sales figures with any degree of accuracy this early in the year, but Ford's 1954 record is worth watching, even if it can't be termed an omen.

Ford is leading Chevrolet in both sales and production. In the first two months of '54, Ford built 234,970 cars against Chevvy's 227,093. And new-car registrations for 28 states in January show Ford in front—but just barely.

But Ford led Chevvy this time last year, too, and was handily outrun on yearly totals.

Ford in January and February produced about 130,000 more cars and trucks than it did in the same period last year.

Meanwhile, Chrysler ran about 108,000 units behind year-ago production.

Industry-wide, January was third highest in history with factory sales of 453,378.

General Motors employment and payrolls broke all records last year.

GM's work force was up 92,415 in a year's time to a total of 551,095—exclusive of employees of GM's two car and truck manufacturing subsidiaries in England and Germany.

GM's total 1953 payrolls added up to $2.6 billion, as against $2 billion for 1952.

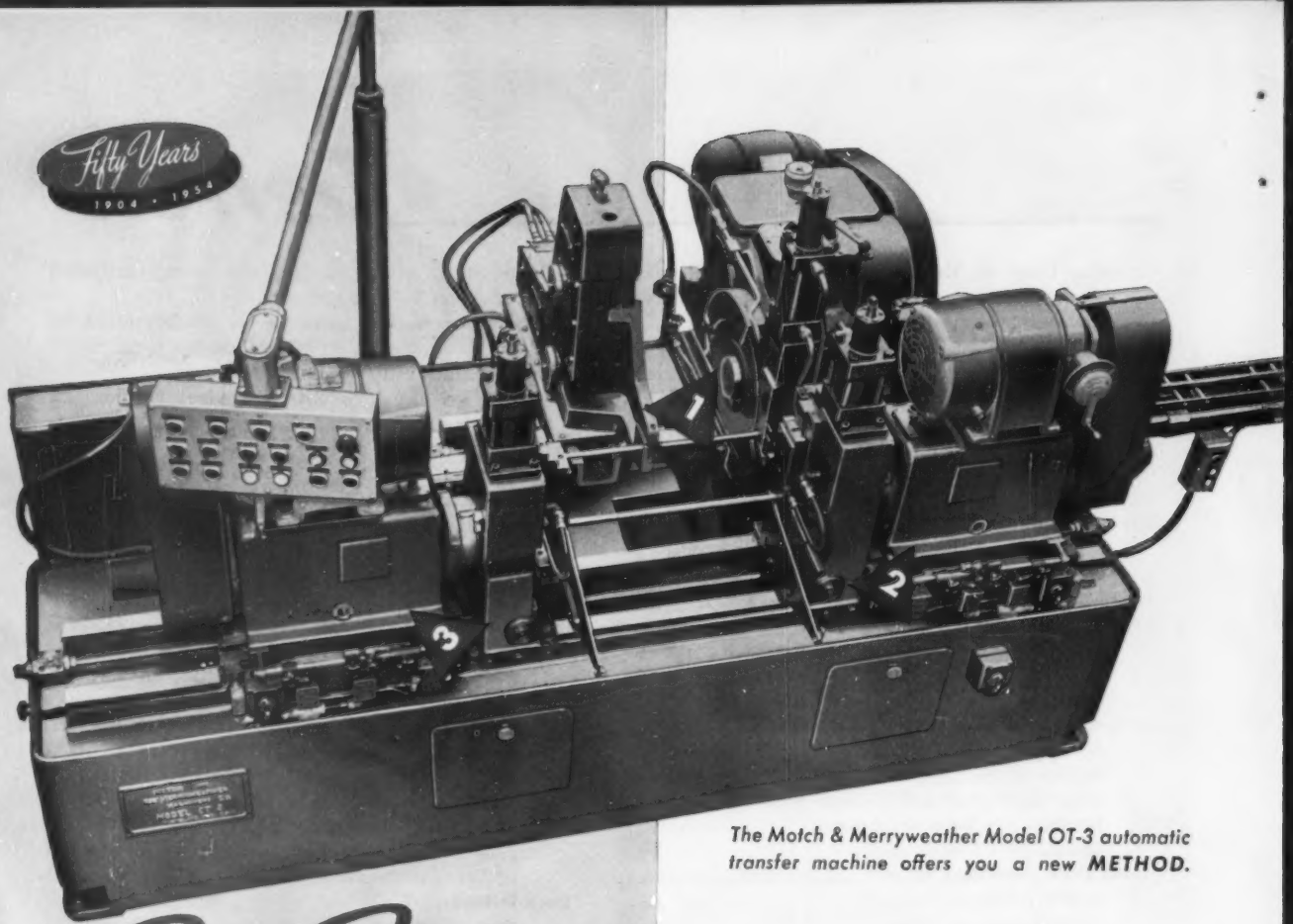
Hourly-rate employees earned an average of $92.27 a week, against $85.24 for 1952.

• • •

Heard that rumor about GM wrap-around windshields? They're saying "if you change a rear tire on a Buick (for instance), you also change the windshield," i.e., hoisting your car with a bumper jack cracks the windshield.

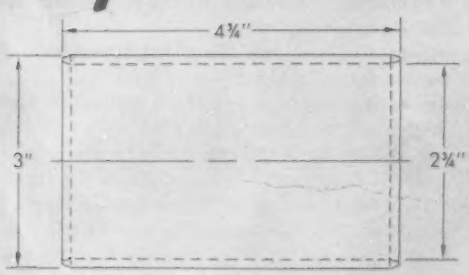
Well, there's no truth in it. Michigan Auto Club checked it. Found not a single insurance claim was filed on that account.

Fifty Years
1904 • 1954

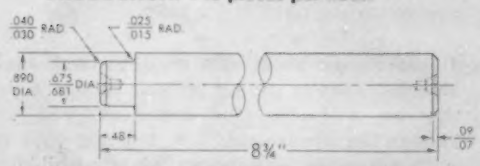


The Motch & Merryweather Model OT-3 automatic transfer machine offers you a new ***METHOD.***

Buy Profits – PUT 3 HEADS TO WORK SIMULTANEOUSLY!



OPERATION: Cut off, chamfer inside and outside, and face.
MATERIAL: SAE 1020 steel tubing.
PRODUCTION: 140 pieces per hour.



OPERATION: Cut off, turn radius, chamfer and center drill one end; chamfer and center drill opposite end.
MATERIAL: SAE 1020.
PRODUCTION: 288 pieces per hour.

MP/SF
Most Production per Square Foot

Cut off to square, accurate, milled-finish lengths and double-end machine your work continuously, and simultaneously. Bore, face, chamfer, center drill, turn, ream, or groove singly or in combination. Cut-off time is virtually free. Save labor; save tooling, time, overhead, floor space.

THE MOTCH & MERRYWEATHER MACHINERY CO.

CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Turning and Special Machines

Machine Tools

Nearly $1 billion of machine tools will be produced and shipped to customers by US builders this year, Charles F Honeywell, administrator, Business and Defense Services Administration, predicted to members of the American Machine Tool Distributors Association at their spring meeting at Boca Raton, Fla.

Mr Honeywell based his prediction on these facts and estimates: about $94 million of machines were produced in January. At the end of that month the backlog for the industry stood at around $600 million.

• • •

The Department of Defense has indicated its intention to place orders for $150 million of tools in the next six months.

On top of that, there is reason to believe that $100 million of the $250 million appropriated by Congress for "elephant" tools will be spent soon and can be counted in 1954 production.

The assumption is that all of the items thus enumerated can be lumped into this year's business. Without adding any civilian orders that are sure to be placed, a total of close to $1 billion is reached.

• • •

Some observers familiar with the situation feel that Mr Honeywell made too optimistic a prediction—one that isn't wholly realistic.

The Department of Defense, because of many technical difficulties often is slow in converting machine tool wants into orders.

• • •

The Services have a list of machines that they would like to have under the Vance Plan. But up to now Defense Secretary Wilson has refused to commit any of the $250 million available into orders for elephant tools.

Even though Mr Honeywell's estimate is scaled down somewhat, the fact remains that 1954 will be a good production year for the machine tool industry as a whole.

• • •

Score a victory for keeping government-owned machine tools from being leased for civilian work.

The Department of Defense withdrew the request that the deal be approved whereby Brown & Root Co, Houston, Texas, would be permitted to rent idle Army Ordnance machines now in its plant.

A key BDSA official made a special trip to Texas to look over the situation and get all the facts. When all the circumstances surrounding the proposed leasing agreement were known, the Defense Department abandoned the project (for the reasons, see p179).

But don't put too much reliance on this case as a criterion of future policy.

Pentagon has, or will have soon, 1500 to 2000 so-called "production packages" of machine tools in contractors' plants, to be retained for activation in a future emergency.

Most of them belong to Army Ordnance Corps, which would like to lease them to present holders, thus avoiding maintenance charges.

BDSA is solidly opposed to the plan because it is inimical to private enterprise.

One suggested plan is to insist upon long-term leasing at rates comparable to those that industry would charge, instead of granting the usual 1%-a-month rate for whatever time suits the lessee.

If that plan should be followed, contractors would be less likely to lease US tools.

• • •

Some 628 exhibitors have taken space at the European Show in Milan, Italy, next September.

Germany leads all other countries, as it did at Hanover in 1952 and Brussels in 1953. Thus far 245 German builders have contracted for "stands."

Italy comes next, with 138 companies showing. That is to be expected, with the exhibition being held this year in that country.

Some 69 French builders have signed up, and 65 Swiss. Other exhibitors are: Belgium 16, Sweden 15, and Holland 12.

Other exhibitors, 27 in number, are lumped together. Included in the miscellaneous group is an unknown number of US builders.

Soviet Russia is to be represented by exhibits at Milan, according to persistent stories.

• • •

Sentiment expressed by distributors attending the spring meeting of the AMTDA was in an optimistic vein. Everyone is aware of the tough selling job ahead, but inquiries show that there is lots of business to go after.

Some distributors have added to their sales staffs lately. They intend to comb their territories more intensively.

• • •

Sizable orders for machine tools for atomic projects are said to have been placed quietly the past two weeks. A curtain of silence understandably hangs over atomic activities and it is not possible to reveal any details. But the fact remains that the atomic industry is a good source of machine tool business from time to time.

BF

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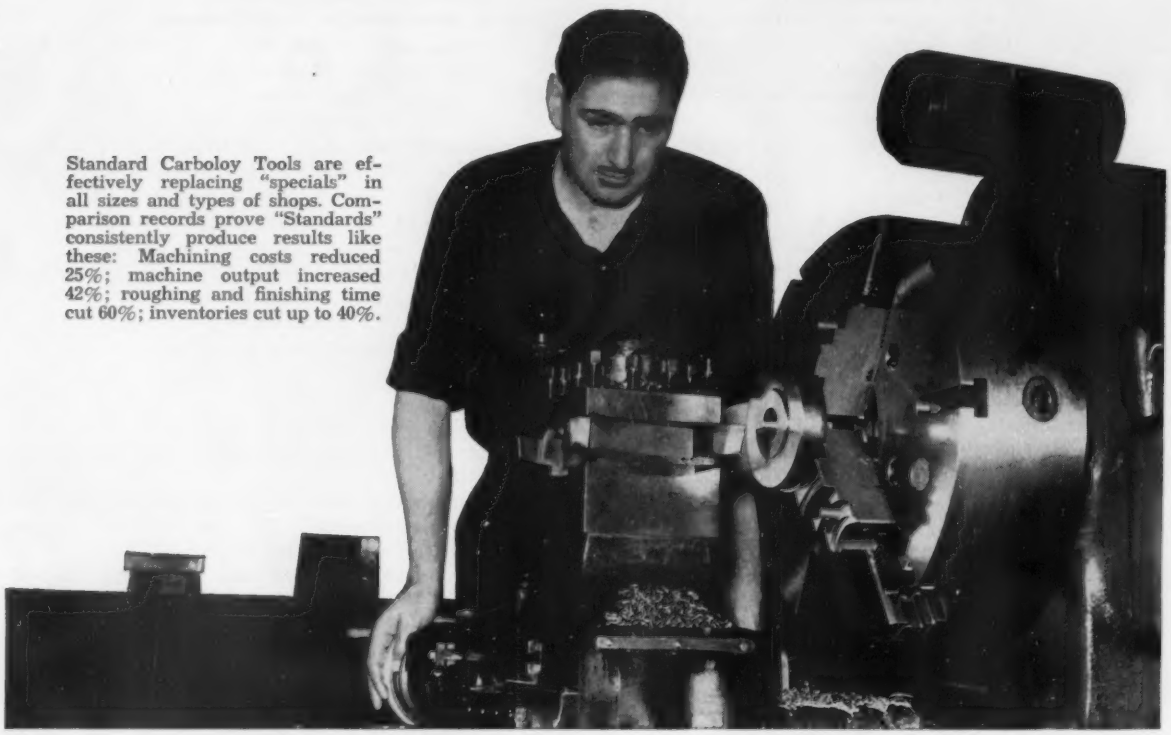
CEMENTED CARBIDE

reduce inventory, increase output, cut production costs on single-point tool jobs

Standard Carboloy Tools are effectively replacing "specials" in all sizes and types of shops. Comparison records prove "Standards" consistently produce results like these: Machining costs reduced 25%; machine output increased 42%; roughing and finishing time cut 60%; inventories cut up to 40%.



JUST ELEVEN Standard Carboloy Tools — styles A to G — will do up to 80% of all single-point tool jobs . . . outlast steel tools by as much as 10 to 1. Use them "as is" for turning, facing, boring . . . or adapt them quickly to your own "specials."

By using "Standards" you'll eliminate hundreds of costly, inventory-loading special tools. You'll slash downtime to an absolute minimum. Your local Authorized Carboloy Distributor can always give you immediate delivery on all Standard Tools and blanks, insert blanks and boring tools.

Standard Carboloy Tools are available to handle every single-point tool job. Send coupon, today, for free technical literature.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

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11149 E. 8 Mile Road, Detroit 32, Michigan

Send me the following, without cost or obligation:

- ☐ Application data on Grade 370.
- ☐ "Brief-A-Log" Condensed Catalog and Price List, GT-265, with "Standard" specifications.
- ☐ Have a tool expert call to show us how to use "Standards" effectively.

Name_____ Position_____

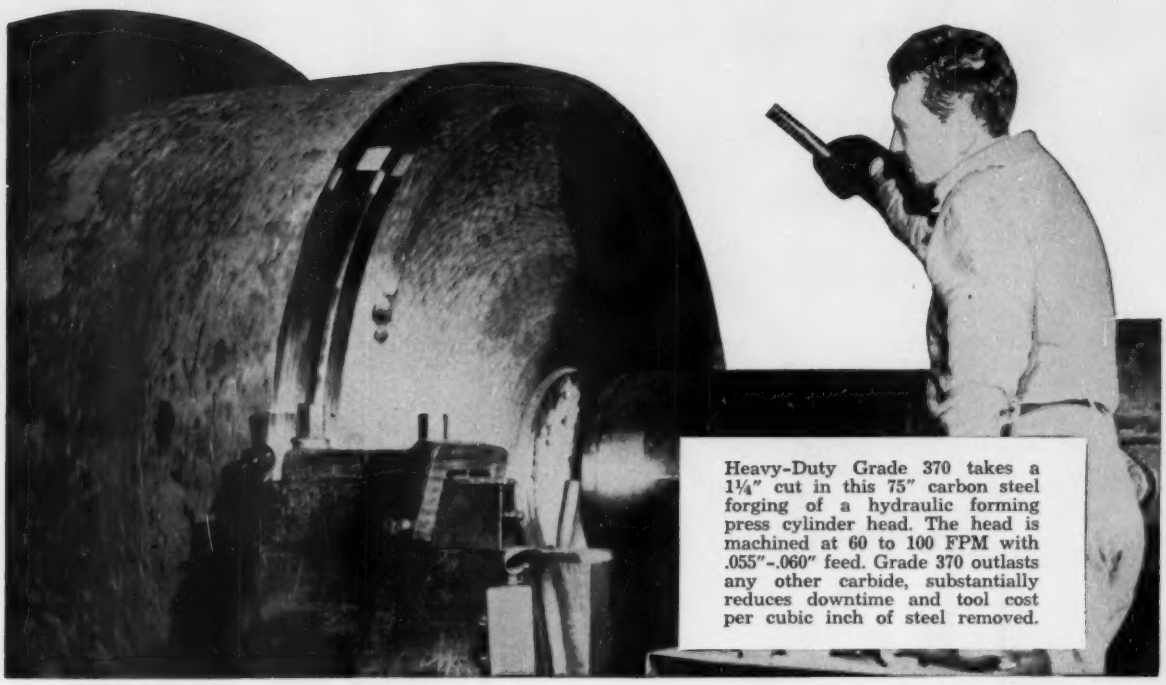
Company_____

Address_____

City_____ Zone_____ State_____

NEW CARBOLOY® GRADE 370
CEMENTED CARBIDE

cuts more cubic inches of steel per minute— with longer tool life—than any other carbide



Heavy-Duty Grade 370 takes a 1¼" cut in this 75" carbon steel forging of a hydraulic forming press cylinder head. The head is machined at 60 to 100 FPM with .055"-.060" feed. Grade 370 outlasts any other carbide, substantially reduces downtime and tool cost per cubic inch of steel removed.

NEW Heavy-Duty Grade 370 Carboloy cemented carbide was specially developed for taking heavier cuts in steel, at higher speeds than ever before practical. Grade 370 cuts more cubic inches of steel per minute – with longer tool life – than *any* existing carbide.

Other carbides fail when machining at higher speeds because the tremendous temperatures and pressures deform their cutting edges. Heavy-Duty Grade 370, manufactured by an entirely new process, has a built-in rigidity to resist this deformation, even at temperatures of around 1800° F.

Carboloy Grade 370 is being used successfully on such tough, heavy-duty applications as rolls, gun barrels and locomotive wheels. Grade 370 lasts longer than any other carbide – *increases production by as much as 30%.*

The first of the new Series 300 steel-cutting carbides, Heavy-Duty Grade 370 is available immediately in a number of sizes and shapes. Trained engineers from the Carboloy Engineering Appraisal Service will work with you on your heavy-duty cutting jobs. Send coupon, at left, for information, and for free technical literature.

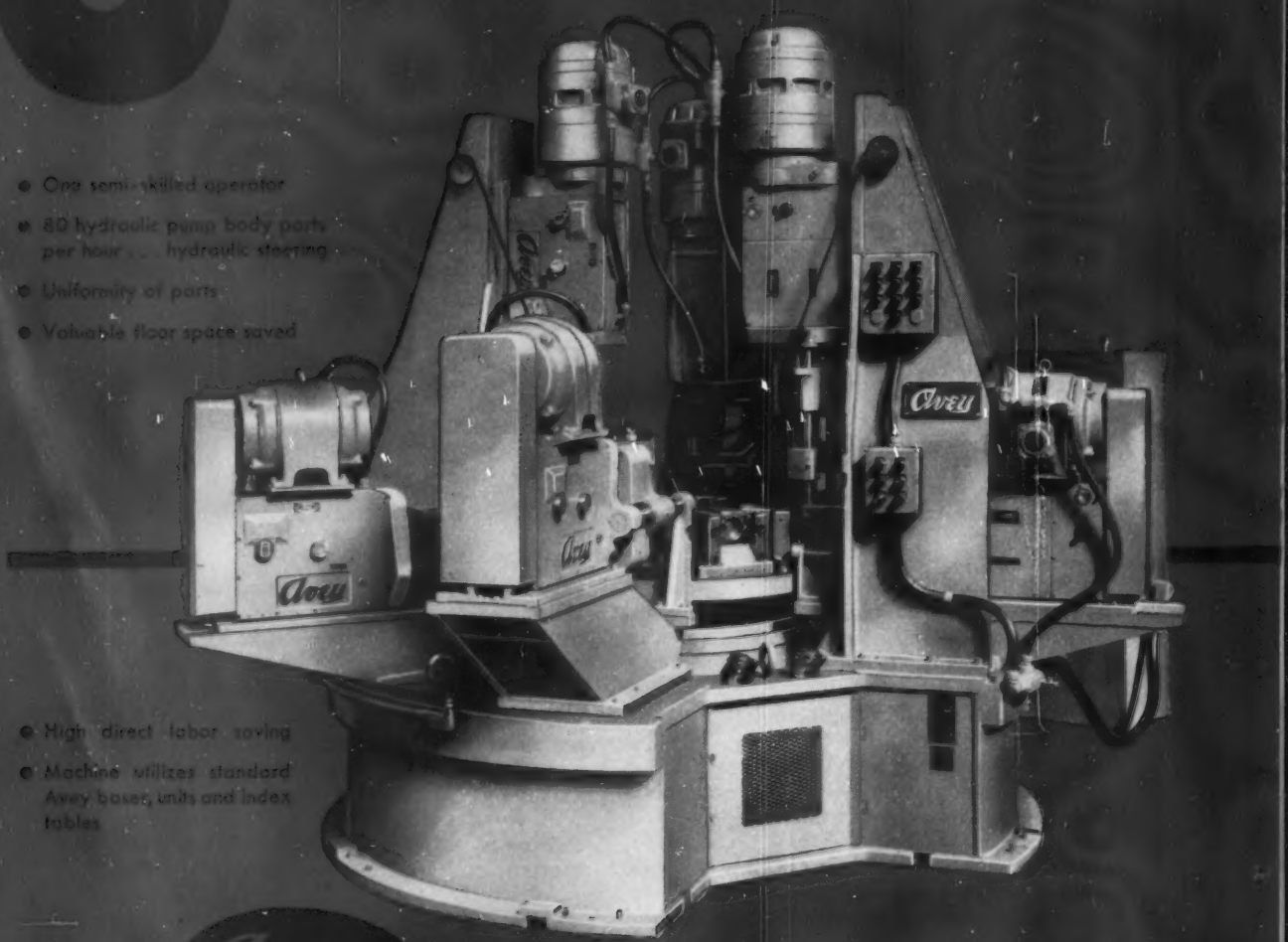
CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

Avey

MILLING • DRILLING • TAPPING MACHINE

3 *machines in one . . .*

MILLS . . . DRILLS . . . TAPS . . .



- One semi-skilled operator
- 80 hydraulic pump body parts per hour . . . hydraulic steering
- Uniformity of parts
- Valuable floor space saved
- High direct labor saving
- Machine utilizes standard Avey bases, units and index tables

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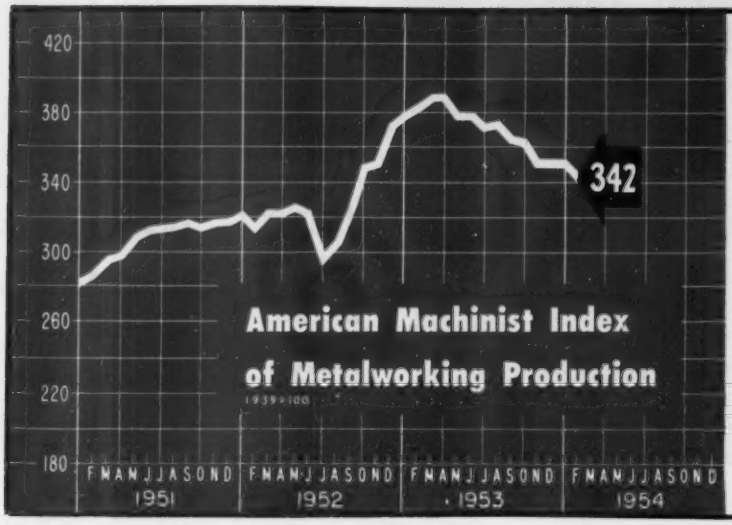
It will pay you to be up to date . . .
Write for recommendation on your jobs from Avey.

THE AVEY DRILLING MACHINE CO., Cincinnati 1, Ohio

Gaging Metalworking



PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	FEB '54(*)	JAN '54(p)	DEC '53(r)	JAN '53
Tot. Index..	**342**	**342**	**352**	**368**
Machinery	**308**	**316**	**338**	
Electrical Machinery	**367**	**392**	**410**	
Autos	**273**	**284**	**294**	
Other Transportation	**594**	**592**	**602**	
Other Metalworking	**336**	**342**	**357**	

(*) Estimated (p) preliminary (r) revised

After a sharp drop in last quarter 1953, steel mills have been operating at about 75% of capacity.

But because of recent expansion, that capacity is comparable to 80% a year ago.

Steel warehouse shipments have been dropping since December—were off 7% in January.

But customer orders are increasing. Catch is that the average weight of material per order continues to decrease.

One reason for this is that steel makers are dropping their sights on tonnage requirements of orders they will handle.

One Cleveland steel warehouse reports an alloy steel maker will accept orders for one-ton lots and deliver them in under 30 days.

• • •

Sheet and strip customers can call their shots today —getting just about any tonnage and delivery-time they want.

"It used to take 2-3 weeks to paper process an order at the mill—now that's the delivery date," one warehouser says.

Steel warehousers say this ease-off in tonnage and delivery requirements has helped their business in the past. And they hope it'll do it again.

• • •

Bulging steel inventories are a headache to many warehouse operators, especially those caught with distress material.

One reason is that the mills caught up with back orders in December and filled all the warehouses to the brim.

That's why warehouse salesmen are hunting orders in spots they haven't visited in years.

Gear sales volume dropped off 13.7% between January 1954 and December 1953.

But sales are still 'way above pre-Korea. American Gear Mfrs Assn Index (1947-49 = 100) was 167.4 for January.

• • •

Cutting fluid sales are on the rebound after a slow January and February.

Oil men are optimistic over the cutting fluid sales outlook for the next six months. Even though some industries are using less, others are holding their own or improving. And the balance is to the good.

• • •

Appliance business looks good. Here are a few representative unit sales figures for January: washers 249,956 (a gain of 30.5% over December); dryers 82,195 (about even with December); ironers 9972 (41.7% gain).

And vacuum cleaner sales rose 16% in January to a total of 221,223 units.

But sales of almost all appliances were substantially lower than a year ago.

• • •

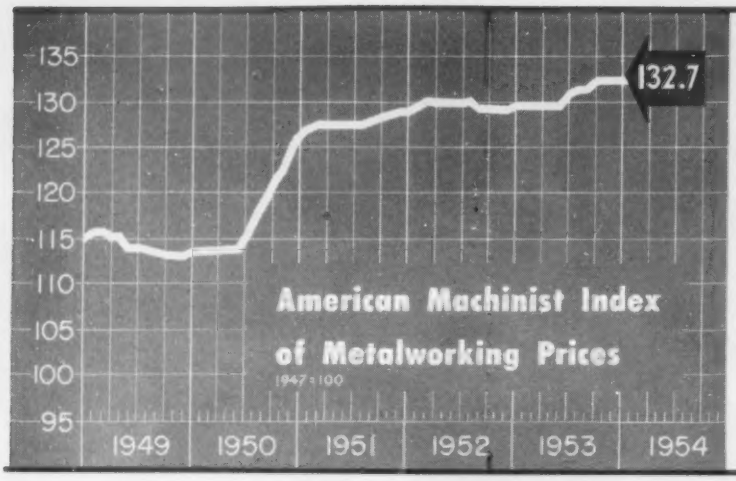
Good business for 1954 is predicted by construction machinery manufacturers, who had their best year in 1953 ($46.5 billion sales).

They think '54 will be slightly below that figure — 6-8% less. And this reduction will be at least partially absorbed by less overtime payments. And no production layoffs are expected.

• • •

Things are looking up for tool and die firms in the Chicago area. Some shops are even working overtime. But no one in the industry wants to predict how long it will last.

Gaging Business



PRICE INDEX

	FEB '54(*)	JAN '54(p)	DEC '53(r)	JAN '53
Total Index	**132.7**	**132.7**	**132.6**	**129.7**
Metalworking Machinery	**141.8**	**141.8**		**137.8**
Other Machinery exc. Electrical	**137.3**	**137.4**		**132.4**
Electrical Machinery	**132.0**	**132.0**		**124.5**
Fabricated Metal Products	**129.1**	**128.9**		**128.3**

(*) Estimated (p) preliminary (r) revised

Two things could cut down recession — one is political, the other economic.

The political development is President Eisenhower's statement that the government will take decisive steps to check the decline if conditions don't improve by spring.

The economic factor is the high speed at which inventories are being cut back.

• • •

Business generally is off 4% from 1953's peak second quarter, as measured by the Gross National Product.

And industrial production is off 10% from its July 1953 peak.

• • •

Main reason why gross national product is down is because of inventories.

In the first three quarters of '53, businessmen were adding to inventories.

But since October they've been cutting back —fast. For the first half of '53 they added to inventories at an annual rate of $5 billion. But in first quarter '54, they've been cutting back $5 billion.

The net difference is a $10 billion decline. But it's hoped the inventory situation can be corrected before the year ends.

Capital spending will hit an all-time high this season, in the face of business decline. And many new programs are underway.

• • •

Consumers aren't doing their part in bolstering business, even though they're making more than they did this time last year. Reason is that a lot of them are just plain scared they might lose their jobs. So they're pinching pennies for a rainy day.

• • •

January's unemployed numbered 3.1 million—about 1 million more than a normal seasonal increase from last fall's low of 1.2 million peacetime unemployed warrants.

WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	122.6	123.0	134.8
Steel ingot production (thousand tons)	1,682	1,756	2,262
Electric power output (million Kilowatt hours)	8,396	8,551	8,070
Production of automobiles and trucks	146,116	148,257	167,779
Engineering construction awards (*Eng. News-Record*, millions)	$208.1	$225.7	$273.7

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	N.A.	197	347
Vacuum cleaners sales (thousands of units)	221	191	256
Washers sales (thousands of units)	250	197	277
Household electric ranges sales (thousands of units)	N.A.	74	109
Radio production (thousands of units)	872	1,101	1,093
Television production (thousands of units)	421	450	719
Gear sales index (1947-49 = 100)	167.4	194.0	161.4
Foundry equipment new orders index (shipments, 1937-1939 = 100)	N.A.	494.3	301.0

* Seasonally adjusted N.A. Not Available

"Do it the easy way" says Stainless Sam

PRODUCT: Stainless Steel cap screw.

EQUIPMENT: Multiple spindle automatic.

MATERIAL: Type 430, ¾-inch diameter bar stock (not free-machining).

OPERATION 1: Turning with box tool.

PROBLEM: Poor turned surface—low tool life.

SOLUTION: On examining the work, Stainless Sam saw that the turned surface was being marred by short chips that clogged the tool. To free the box tool of broken chips, he gave the tool a chip-curler grind as shown at right. This grind produced a long, spiral chip that cleared the box tool, gave a satisfactory finish and good tool life.

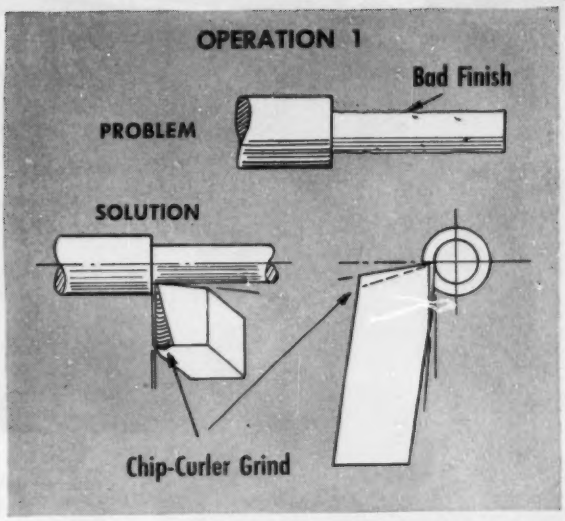
OPERATION 2: Threading with self-opening die head.

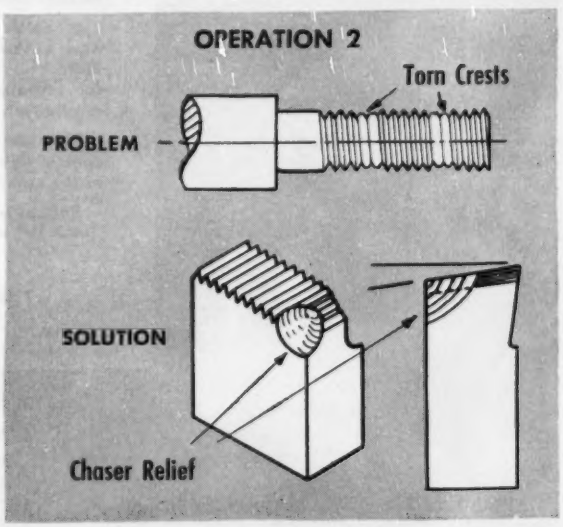
PROBLEM: Poor threads with torn crests.

SOLUTION: The condition indicated lack of clearance at lead angle where pick-up occurs. So Stainless Sam ground a substantial relief up to the first full tooth on all four chasers. This reduced bearing area of chasers at lead angle, permitted better lubrication with cutting oil. Satisfactory threads resulted.

* * *

Stainless machining problems have their answers. Many of them are discussed at length in Armco's latest edition of the booklet, "Machining of Armco Stainless Steels." Write for your copy today. Speeds, feeds and tooling recommendations will help you machine stainless steels readily with standard equipment.





ARMCO STEEL CORPORATION

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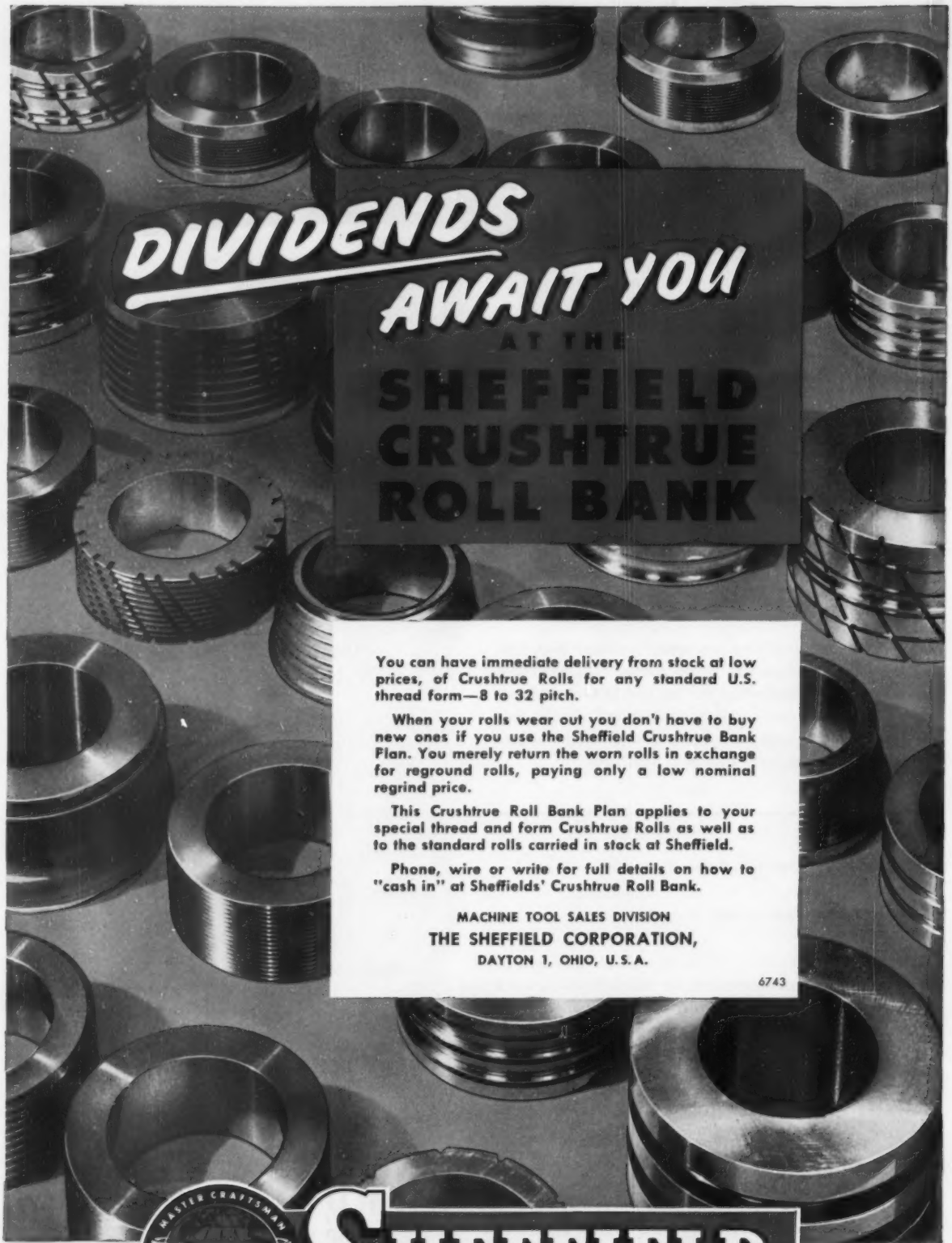
EXPORT: THE ARMCO INTERNATIONAL CORPORATION



You can have immediate delivery from stock at low prices, of Crushtrue Rolls for any standard U.S. thread form—8 to 32 pitch.

When your rolls wear out you don't have to buy new ones if you use the Sheffield Crushtrue Bank Plan. You merely return the worn rolls in exchange for reground rolls, paying only a low nominal regrind price.

This Crushtrue Roll Bank Plan applies to your special thread and form Crushtrue Rolls as well as to the standard rolls carried in stock at Sheffield.

Phone, wire or write for full details on how to "cash in" at Sheffields' Crushtrue Roll Bank.

MACHINE TOOL SALES DIVISION
THE SHEFFIELD CORPORATION,
DAYTON 1, OHIO, U.S.A.

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MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

It's the People Who Count

Have you ever been on a train stalled out in the country? When you tried to find out what was wrong, the train crew professed ignorance. You didn't like it, did you?

When that sort of thing happens in industry, watch out! Employees, like train riders, resent being kept in the dark. As long as they are affected directly or indirectly, they want to know what's going on.

It used to be popular for management to "play it cozy" — to tell as little as possible about anything and everything. The company's business was not the employee's business.

Changes were made around the shop. Machines and men were shifted. People were taken on and laid off. New products were added and some old ones dropped. But workers ostensibly were not officially informed of these happenings around them.

This kind of procedure does not go anymore. It does not go because management has learned the wisdom of taking its employees into its confidence. What once was regarded as private is now public information.

Various means of communication are used to tell employees what is going on. Some companies report their affairs to their employees in letters signed by the president and sent to their homes. News is posted on bulletin boards too.

Other companies gather their employees into groups and inform them about management's doings. Employees have a chance to ask questions freely in open sessions about all phases of the business.

At least a few manufacturers issue shop letters to employees, distributing them through the supervisors. One company that sends out such a letter monthly states frankly how business is and plots on a chart the new-orders curve.

Farther along in one of these shop letters, and typical of the technique employed, this statement appears: "A few more facts and figures on the plight of our industry may help explain present conditions and the worried looks and short tempers you may encounter on occasion among the members of your management team." Then the situation is outlined in detail.

This shift in policy in recent years from secrecy to frankness is part of management's recognition that people are the most important ingredient of a successful business. Employees, like management, spend a large share of their lives at work. They want to feel worthy of management's confidence. They want to know the company's news, whether good or bad.

Management should not stop at this point, however. It should find out what employees are thinking about. That can be done by building a mutual confidence that will encourage workers to speak their minds without fear of criticism or reprisal.

What we are getting at is simply this: It is the people who count in making a product. Raw materials, machines and other factors are necessary, to be sure. But, as Thompson Products Inc has put it so well, "the most complex and essential element of production is people. . . . When they give freely of heart, energy and intelligence, their joint efforts inevitably result in success."

Burnham Finney

shearing 30 sizes in 6 gauges accurately... on CINCINNATI SHEARS

Photo courtesy of St. Charles Manufacturing Co.

Shearing 400 items of kitchen and hospital equipment from 10 to 24 gauge sheets, on two nine-hour shifts six days a week, 4 Cincinnati Shears equipped with the Cincinnati Magnetic Sheet Support are highly productive machines in the St. Charles Manufacturing Company shops.

The Cincinnati Magnetic Sheet Support eliminates sag in thin sheets, permits quick, positive gauging, and increases the production of accurate blanks.

Write for Shear catalog S-6.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

American Machinist

TOOL-PLASTIC RESIN is mixed in a regular bakery dough mixer and poured in mold to form backing block for a stretch form

how Convair tools with plastics

Cast and laminated resins are practical and economical tooling methods. Here, in step-by-step procedures, are the methods used by Convair for each type of tooling

H H ROSENBAUM, plastics engineer, CONVAIR, SAN DIEGO

Convair's interest in plastic tools dates back to about 1942 when cast phenolic plastics were being investigated as a possible material substitute for Kirksite, aluminum, and steel for various metal-forming tools. Plastic materials then available consisted of several formulations of liquid phenol-formaldehyde casting resins which were cured by heat, the addition of a catalyst, or both. Essentially the resins were all plastic and consequently exhibited considerable shrinkage upon setting or curing. This initial shrinkage could be tolerated, but the dimensional changes that occurred over extended periods were undesirable.

Efforts were directed toward improving stability of the resins so their other inherent advantages could be utilized. Incorporation of fillers in the resin mix appeared to be the most likely solution, and it was found that several materials would be satisfactory, including asbestos fibers, ground walnut shells, and wood flour.

At the same time, an investigation of different curing agents or catalysts was carried out. Result of the research was a cast phenolic material that had good casting properties and remained dimensionally stable for long periods of time. This material was named "Toolite," and its manufacture and distribution was licensed to an out-of-plant manufacturer. Techniques were evolved which constantly improved the tools, and, by the end of the war, plastic tooling was firmly established not only at Convair but in practically every other aircraft plant in both the United States and Canada.

Other aircraft manufacturers and material suppliers worked on the problems encountered with cast plastics, and as a result we have today several satisfatcory casting compounds.

Laminated plastics were first considered at Convair in 1951. Initial work, while far from satisfactory, indicated that they had great potentiali-

FOAM PLASTIC CORE has been attached to backing plate (right) and rubber pad removed ready for next step in manufacture. Shallower stretch form at left is completed with a layer of tool plastic cast and cured over the foam core

CATALYZED RESIN is brushed into a layer of glass cloth as a drill fixture is built up on a leading-edge section. Actual parts, as in this case, or wood or plaster mockups, serve as the model for laminated plastic fixtures. Additional layers of glass fabric and resin are applied to give the required thickness

ties. After acquiring a certain amount of know-how and standardizing on procedures, techniques were developed which produced good laminates and satisfactory tools. The first laminated-plastic tools for production were made a little over a year ago; since then, great strides have been made in producing a wide variety of jigs and fixtures.

CAST TOOLING PROCEDURE

The material most widely used at Convair for casting purposes is a modified liquid-phenol-formaldehyde resin known as Rezolin. The material is received in 55-gal drums and is stored in a cold box at a temperature of 35 F. When a casting is to be made, the required amount of resin is drawn from the drum and an accurately measured amount of catalyst or accelerator is mixed in. The resin mix is then poured into the prepared mold and allowed to cure either at room temperature or at 160 F, depending on the utility of the finished article.

A manual available for this material describes methods for making stretch forms, draw dies, nesting fixtures, assembly fixtures, and other cast tools. The methods produce satisfactory tools and can be used as a general guide. At Convair, many deviations from the prescribed procedures are made, and in general the results have been excellent. For example, stretch dies are made with a foamed plastic core rather than with a builtup wood-and-plaster core. Here is the procedure:

1. A plaster shell or splash is taken directly from a production mockup. The shell is generally made to include a slightly larger area than is actually required.

2. The shell is set in the stretch position and inverted.

3. A box is built around the plaster with plywood or plaster slabs, the plaster shell serving as the bottom of the box.

4. A layer of 1- or 1½-in. drop-hammer rubber is placed in the bottom and on the sides of the box directly in contact with the plaster shell, and sheets of waxed paper are placed over the rubber.

5. A steel plate of the proper size, with suitable pouring and vent holes cut in, is fitted to the top of the box. Prior to assembly, locking strips made from scrap I-, H-, or Z-sections are attached to the under side of the plate. These strips provide a mechanical locking of the steel plate to the plastic core, and stiffen the form to minimize deflections if it overhangs the stretch-press platen.

6. The plate and locking strips are coated with either Vulcalock cement or with a Fuller acid-resisting lacquer. This coating is applied to prevent a chemical reaction between the metal and the acidic casting compound.

7. The sides of the box are sealed with lacquer and a coat of wax is applied.

8. The steel plate is clamped to the sides and the mold is sealed on the outside with plaster.

9. The material which forms the core or the support of the stretch form is mixed and poured into one of the pouring holes in the steel plate. The core material is known as Rezolin Corefoam and cures to

HOLES ARE DRILLED in molded fixture to take drill bushings. The laminate will pick up hole locations from the model. Exact locations are then determined optically and pilot holes drilled

TYPICAL LAMINATED TOOLS include a checking fixture, a drill fixture, and a saw fixture in the foreground; a drilling and piercing fixture at the rear

a foam-like material with a density of 14 lb per cu ft.

10. This core is cured at 77 F for 1 hr, removed from the mold, and post-cured for 8 hr at 160 F.

11. The drop-hammer rubber is removed from the mold, leaving a void between the plaster splash and the core.

12. The plaster splash and sides are treated with a wax separator and the core is placed face down into the mold.

13. The Rezolin tool plastic is mixed in the ratio of 100 parts of resin and 25 parts of accelerator paste by weight and poured through holes in the steel plate.

14. Mold and contents are allowed to set at room temperature until the plastic is firm. This initial setting time will vary with the size of the tool, the heat-transfer properties of the mold, and the temperature of the room.

15. After initial setting occurs, the mold and contents are placed in an oven at 160 F and cured. In general, castings of 100 lb and under will require from 8 to 12 hr for curing. When the greatest stability is needed, a 24-hr oven cure is recommended.

16. After the prescribed baking period, the casting is allowed to cool to room temperature before removal from the mold.

17. Locating pins or other inserts are attached by drilling oversize holes and locked in place with a room-temperature-curing resin.

This procedure is also used for casting other tools. When a solid casting is required, procedures are varied to eliminate the foamed core, but in general, the same care and precautions are necessary.

PHYSICAL PROPERTIES OF CURED RESIN STRETCH FORMS

Flexural strength, psi	8,000
Modulus of elasticity in flexure	5 to 7 x 10^5
Compressive strength, psi	11,000
Tensile strength, psi	5,000
Impact strength, ft. lb/in. of notch	0.24 to 0.3
Water absorption	0.4%
Linear coefficient of thermal expansion, in./in./°F	6.2 x 10^{-6}
Specific gravity	1.26
Shrinkage from mold dimensions	negligible
Color	orange

Although the raw-material cost of the resin is relatively high compared with metals, the large volume per pound (22 cu in.) offsets the material cost. Besides being lighter in weight and easier to handle than comparable metal tools, the greatest advantage of the plastic tools is that very little labor is required to finish the working surface. The material will faithfully reproduce the surface against which it is cast so that a smooth, polished mold will yield a smooth, polished casting.

Because shrinkage from mold dimensions is negligible, close tolerances can be maintained with patterns or models constructed to standard scale.

Impact resistance of cast plastics is generally low, making it desirable to round off edges and corners of

tools to prevent chipping and cracking. Where necessary, repairs are made with room-temperature-curing materials. Where concentrated loads are applied, local reinforcement with metal inserts or plates is practical.

LAMINATED PLASTIC PROCEDURE

Plastic laminates for tooling can be used for a wide variety of tools. At Convair these include trim shells, drill shells, marking templets, assembly fixtures, welding fixtures, saw fixtures, drill fixtures, nesting fixtures, and tooling gages. Many of these tools were formerly made from conventional materials and the change to laminated plastics not only saved labor and time, but has effectively cut down the rejection rate from scratching during fabrication, which has been one of the most serious causes for rejection in the shop.

In general, the laminated plastic tools are made with a room temperature curing resin and glass-fiber fabric reinforcement. The tools can be made directly from a production mockup, from a plaster splash, or from an actual part, if one is available.

Resins used at Convair for laminated tools are of the polyester and epoxy types. Through the use of the proper catalysts and accelerators, these resins cure at room temperature without pressure and in the presence of air. Currently the polyester is Plaskon 941 laminating resin and the epoxy is Rezolin L-900 laminating resin. The Plaskon 941 resin was chosen because it had the best dimensional stability over a given temperature range of the polyesters tested. This feature is important where close tolerances are required under working conditions of varying temperatures. The Rezolin L-900 resin is now being used because of its non-shrink characteristics, dimensional stability, ease of handling, and good interlaminar strength. Other epoxy-type resins are being evaluated at the present time to determine the most advantageous material. In general, the polyesters are more widely used because their costs are approximately one-third those of the epoxy types. However, in cases where extreme dimensional accuracy is required, epoxy resins are specified.

The reinforcing material is generally glass-fiber cloth or mat. Other fabrics, such as canvas or cotton duck, may be used where dimensional stability and impact resistance are not required. At Convair, glass fabrics are used exclusively, No. 1500 tooling cloth being preferred. This is a fabric woven from continuous glass strands with 16 warp threads and 14 fill threads to the inch. It has a weight of 9.7 oz per sq yd and is 0.013 in. thick. It is purchased with a No. 114 finish which results in a more moisture-resistant bond with the resin. When thickness for a tool is required, several layers of spun glass mat may be used between layers of No. 1500 cloth. The mat is constructed of random-length fibers felted or matted without regard for fiber orientation. Because of its bulk, glass mat has a tendency to retain large amounts of resin, which results in an inferior laminate and a waste of resin. More recently a new cloth has been obtained which has a thickness of 0.028 in. and weighs 20.7 oz per sq yd, providing bulk without soaking up an excess of resin. This cloth also reduces lay-up time without sacrificing strength.

Small quantities of finer weave and thinner cloths are used. These have limited applications as surfacing fabrics when a smoother surface is required.

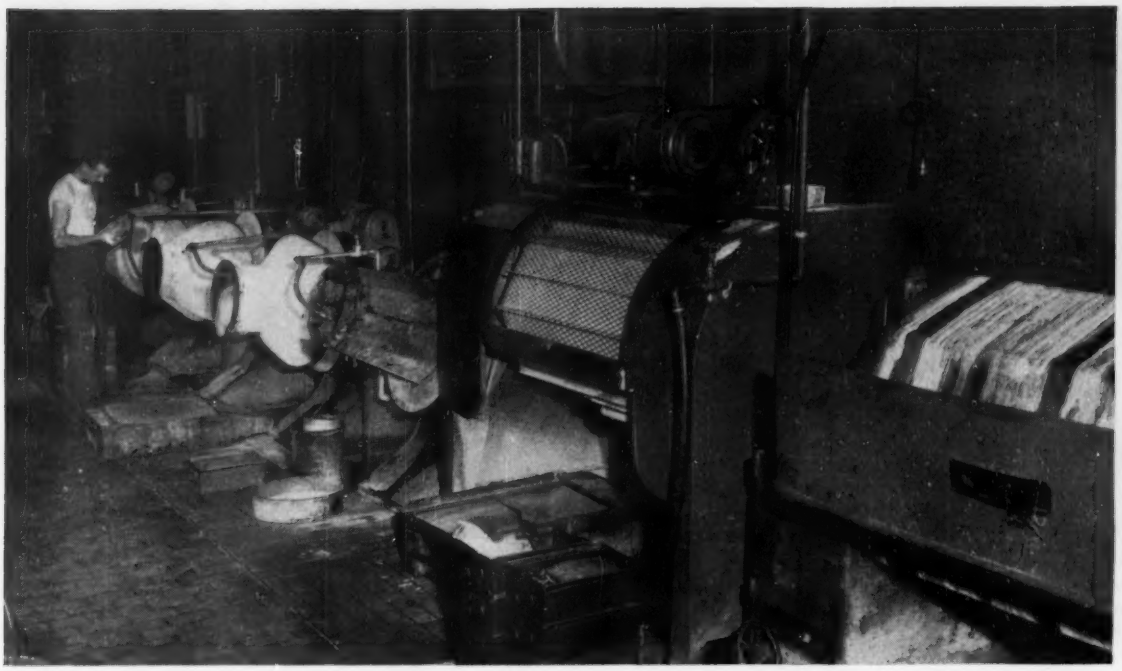
The following procedure for making a drill fixture will illustrate the general method for fabricating laminated plastic tools:

1. If a plaster shell or mockup is used, the plaster should be dry. Several coats of sealer are sprayed on the plaster, followed by a coat of wax separator compound.
2. A quantity of resin is carefully and thoroughly mixed with the recommended quantities of accelerator and promoter. It is important that exact quantities be used and mixed in the proper sequence.
3. A coat of pure catalyzed resin is brushed on the prepared mold surface, and when it becomes tack-free, the first layer of fabric which was previously cut to the proper shape is laid on the treated plaster surface.
4. The resin is applied to the fabric by brushing and working the resin into the fabric.
5. The next layer of fabric is laid over the first layer and more resin brushed in.
6. This is repeated until the desired thickness is built up.
7. The resin will jell or initially set in approximately 35 min from the time it is catalyzed. However, it requires several hours at room temperature before the laminate is removed from the form.
8. Because the resin surface picks up details from the mold on which it is made, hole locations are visible on the surface of the laminate. The hole location is intensified by marking with a pencil.
9. By use of an optical device the hole location is centered and a pilot hole is drilled.
10. The holes are then enlarged with the proper size drill and a drill bushing inserted. The bushing is coated with resin which serves to lubricate the bushing on insertion and which securely locks the bushing after the resin sets.
11. One layer of fabric is generally laminated to the upper surface of the shell after the bushings have been inserted. This serves to further prevent the bushings from falling out in service.
12. The fixture is then trimmed to size, cleaned up, and painted a suitable color. Often a pigment is incorporated in the resin for the final lamination, eliminating the paint in the final cleanup.

A SIMPLE MATTER

As can be seen, it is a relatively simple matter to construct rugged, lightweight tools by the laminating technique. Compound contours and complicated shapes are handled as easily as the simpler shapes, and often great savings are possible compared with conventional tooling.

There are no hard and fast rules except that familiarity with the handling characteristics of the materials is essential to make satisfactory tools.



BARREL LINE shows several of the 15 barrel finishing machines used in this department. Drains 3 ft wide run the length of the working area, in front of each machine, to carry away waste and to keep the floor dry. Each machine is provided with water supply; some barrels have vari-speed drive

BARREL FINISHING...more art than science

Throughout Metalworking there is a frequent misconception that all "tumbling" is the same. This opinion is far from true. There is "one best way" for each material, finish, part size and shape, and desired result. Here is how to set up for versatility as well as efficiency in a large contract shop

LEONARD GIGLIO
foreman, barrel finishing dept
HARTFORD MACHINE SCREW CO
HARTFORD, CONN

While many manufacturers have learned that replacing the burr bench and the polishing stand with barrel-finishing equipment can save many thousand of manhours and dollars, best results are only obtained when the process is properly applied. As in all highly skilled techniques, the ultimate in refinement of tumbling depends upon know-how. It is an acquired art rather than a strict science. However, much can be learned from the information provided by manufacturers of abrasives and equipment.

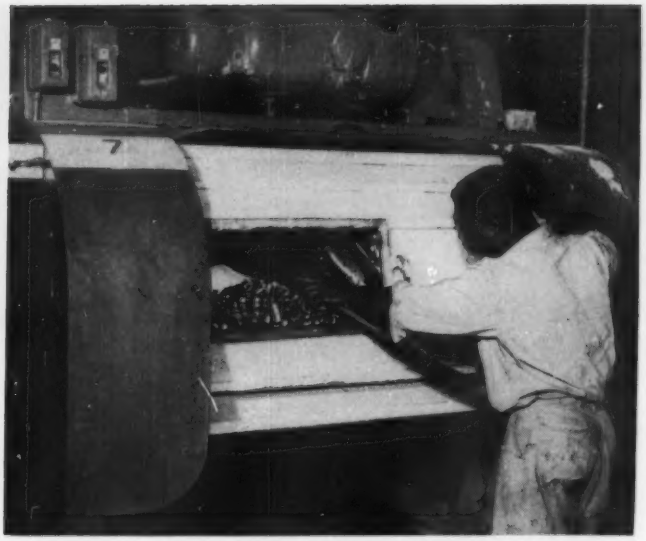
Our experience was gained as a result of a carefully planned experimental program which involved interdepartmental activity and close cooperation with equipment suppliers. Coordination of the interests and problems of departments such as milling, drilling, and grinding was supervised by our process-engineering department, aided by the inspection and cost-standards departments. Modification of existing operations was sometimes found necessary for the best tumbling results and for overall economies.

DATA CATALOGUED

All of the information developed was carefully catalogued and placed in a continuing experience file. Today that file is an immediate reference source on several thousand jobs. It allows us to determine whether we have done a certain type of work before and shows the method found most satisfactory. Also, the file allows us swiftly to estimate the cost of a potential job.

As a major part of our production is close-tolerance parts, it was necessary to be sure that our tum-

WEIGHING assures an accurate ratio of chips to work. With scale fastened to crane hook, worker checks weight of abrasive chips in tote pan before loading into barrel. Pan weight is deducted from total to avoid error



WATER is last addition to barrel containing work, abrasive, and compound before running. This unit is a two-compartment, 30x48-in. model; is equipped with rubber lining and variable-speed drive

bling department was properly equipped and, at the same time, laid out for versatility.

At present, we have 15 barrels of various styles, all equipped with electrical timers and flexible water hoses. Cleaning tanks, chip bins, and a 2000 lb-capacity overhead hoist were also found necessary. Some of the barrels are rubber lined and others are unlined. Also, some barrels are equipped with variable-speed drives; others are constant-speed. One bench-mounted barrel is used for special experimental work. With this equipment we are able to handle any type of screw-machine work that can be barrel finished.

Although the term "tumbling" often is used synonymously with barrel finishing, the latter term should be divided into two categories: tumbling and rolling.

TUMBLING DEFINED

In "tumbling," work (usually automatic screw-machine blanks such as nuts, bolts, taper pins, and roughly blanked parts) is rotated in a barrel with such abrasives as silica sand or pumice. Usually, the barrel is nearly filled with work and abrasive and the objective is rough burring.

For "rolling," the barrel is loaded with work and abrasive chips plus an appropriate compound in such a way that the load rolls and slides in a continuous flowing motion. Abrasives frequently used include: Minnesota Mining's ceramic, Norton's Alundum chips, silica sand, Frederick Gumm's "Clepo," or Magnusson's "Permag." Compounds include various detergents for cleaning chips, rust inhibitors, soaps, and soluble oils.

PRECISE METAL REMOVAL

Properly controlled barrel finishing is a precise metal-removing process. A major reason for its use is the economy as compared to hand polishing or burnishing. This process not only represents a saving in time and money, but is quite capable of maintaining close tolerances previously machined into parts.

To keep accurate cost records, we have separated our tumbling activities into several classes. Abrasive tumbling with ceramic bonded or aluminum oxide chips is used for light deburring, finishing ground parts, polishing, descaling heat-treated work, removing rust, forming radii, blending surface scratches, removing nicks, or breaking inside and outside edges.

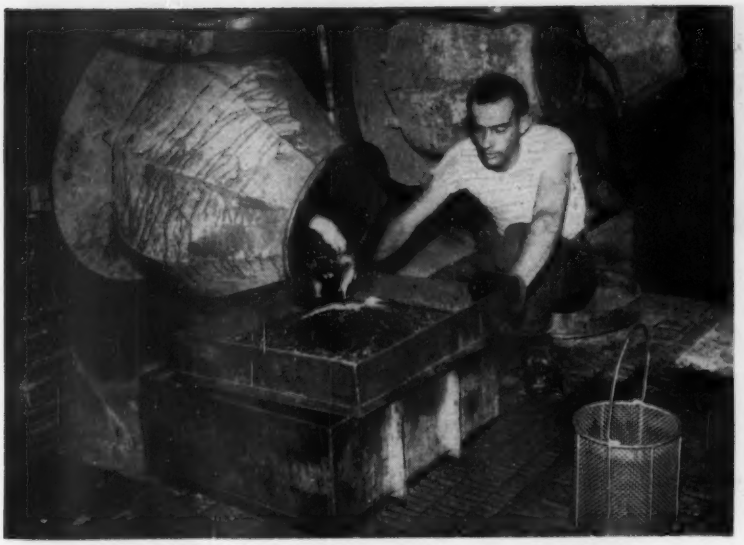
Zinc tumbling, using zinc cones and balls, will produce low microinch readings on ground parts and high, bright finishes. It will handle the breaking of sharp edges as well as light burr removal.

Ball burnishing, using parts plus lime or neutral soap plus steel balls or diagonals, is used to produce brighter finishes on work previously rolled with other tumbling agents.

POSSIBLE SAVINGS

Typical of the saving possible with barrel finishing is this case: There were two stages to the finishing of a small plunger 1 in. long x 11/32 in. in dia and having three equi-spaced grooves milled into the diameter. One operation on a Schauer head rounded the edges of the diameter at 400 pc per hr, then a hand operation scraped the burrs on the milled edges at 50 pc per hr. Combined cost of these operations was $5.63 per 100. Now, we file the burrs on the Schauer head at 310 pc per hr, then tumble the whole order in 3 hr. The total cost is 96 cents per 100. Saving is $4.67 per 100.

An example of our operation is the routine setup for handling an aircraft ferrule, the object being to round all edges. The part is made from 0.875-in. hexagonal



FINISHED LOAD is screened to separate parts from tumbling ingredients. This short-necked bottle barrel was loaded with threaded bolts, ceramic chips, and soap. Pieces are placed in wire basket to await checking and inspection

stock, is turned all over except for a hex collar near the middle, and is drilled through to produce a 0.035-in.-thick wall.

First, the operation sheet is checked for instructions. Then the work is weighed to get the proper number of pieces and the parts are degreased. In the next step the proper weight of tumbling chips is barrel-cleaned for 5 min. in a cleansing solution and rinsed. Parts are introduced, water is added to the proper level, compound added, timer and speed set, and the cycle is started.

After the run is completed, the work is checked by an inspector before unloading. If approved, the work is unloaded and separated from the medium. Then, parts are washed in a tank containing hot alkaline solution, rinsed, oiled, and placed in shop boxes.

For this job, a single-compartment, rubber-lined, variable-speed, 36x24-in. barrel is used. The job consists of 7000 pc and the overall time is 2 hr and 45 min., floor-to-floor.

To avoid turning a barrel of work into a barrel of scrap, we have established certain rules based upon our experience and the necessity for tumbling without affecting close tolerances.

RULES FOR BARREL FINISHING

1. Chip size. After deciding upon the media, care must be taken to select the proper size chips. All sizes which will lodge in drill holes, slots, or recesses must be eliminated, as well as all chips which are the same size as the parts to be tumbled. The reason for this latter selection is that if parts and chips are the same size, screening will be impossible after the operation and a magnetic separator must be used.

2. Chip grading. Chips should be sifted weekly; more often if used frequently or if exceptionally delicate parts are to be rolled. When parts with blind holes are to be run, chips should be screened before each load to eliminate small fragments which might get into the parts and be overlooked during inspection.

3. Ratio. Probably the most important single factor in barrel finishing is the proper ratio of chips to work. An overloaded barrel can become just so much scrap. Safest practice is to start with a ratio of four parts chips to one part work, then to increase the amount of work gradually if this appears to be satisfactory.

4. Compounds. Use the best available materials if you want good results. Select the compound for the job to be done and use it in the amounts recommended by the manufacturer.

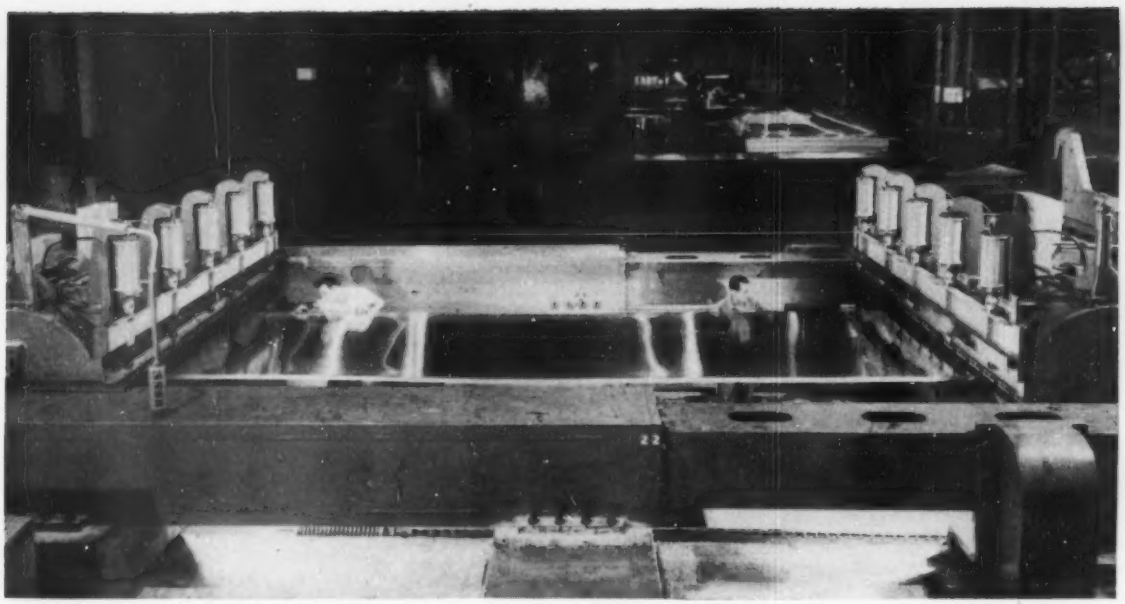
5. Water level. The level will vary with the job to be done. We keep the water level 3 to 4 in. below the mass for removal of burrs, forming of radii, and for dull finishes. For a bright finish, the level is kept 2 in. above the load. Water acts as a cushion and will retard cutting in the removal of burrs if kept high. Varying the level of the water in different loads will cause a great difference in the result.

6. Loading. Duplicate results are usually obtained by loading the barrel with a duplicate ratio of work to chips. Barrels should be loaded between 55 and 65% full. However, if only a good finish is required, barrels may be loaded to 75% full. This will reduce the slide and only minimum cutting will result.

7. Speed. Starting a load at a speed varying between 5 and 10 rpm will prevent nicking and will allow sharp edges to be ground off. After 30 min. the speed can be increased to optimum.

During the years that we have been operating our own tumbling department, we have learned many things, among them that it is impossible to get good work from inferior parts. You can improve but you cannot rectify machining mistakes. Also, shortcuts should always be tried with caution. There are very few substitutes for the proper combination of chip, compound, water, and time. Constant checking on techniques is the only way to assure maximum efficiency. To keep abreast of new methods, we cooperate with other firms maintaining barrel finishing departments and freely exchange information with them.

Our own experimental program continues. No new job is placed in the regular barrels until we have tested the work to be certain that the best method of handling the work is known. The experience file is constantly reviewed and is kept up to date. In short, we have found that the tumbling art is constantly changing and that study and experiment pay off in better and more profitable work.



ALUMINUM-ALLOY PLATE IS STRETCHED on 2,500-ton stretcher. Because plate must be stretched in definite time cycle after quenching, press is adjacent to heat-treating furnaces

Stretch aluminum plate to reduce

Manufacturers, notably airframe producers, using high-strength heat-treatable aluminum alloy plate in applications involving considerable machining have long desired material where residual stresses are held to a minimum in order to minimize distortion in the finished section.

It has been known that stretching is the most feasible method of producing plate with low residual stresses, but equipment limitations have placed a relatively low ceiling on the size of such plate. The 2,500-ton plate stretcher at Kaiser Aluminum's Trentwood Works now makes possible the commercial production of stretched and stretcher-flattened plate in thickness and widths that substantially extend the range of available material.

Controlling factors in stretching are the pounds of pull that the stretcher can exert, yield strength of the material, and its cross-sectional area. Yield strength in psi multiplied by the area in square inches must be less than stretcher capacity in pounds.

Although stretching under specified conditions may also be desirable prior to heat treatment, normal procedure is to perform the stretching operation after the quench that follows solution heat treatment because the shock of rapid quench distorts the material. Subsequent aging, whether natural or artificial (the low-temperature precipitation heat treatment), does not remove the beneficial effects of stretching, nor give rise to new distortion.

After quenching the aluminum is still relatively soft, but alloying constituents quickly begin to precipitate in solid solution at room temperature and strength begins to increase at once. Although the rate of increase varies with different alloys, the gain in tensile strength is relatively rapid in all alloys during the first hour or two. At one hour after quenching, for example, 75S-W material will average about 30,000 psi yield strength at 0.2% permanent set; and 24S-T4 about 33,000 psi yield. After two hours, typical yield strengths are: 75S-W, 34,000; 24S-T4, 36,000.

Therefore, it is obviously essential to schedule production so that plate can be stretched within a definite, brief time after solution heat-treatment.

The yield strengths which will be encountered in the various heat-treatable alloys govern the maximum widths and thicknesses which can be stretched. Nominal maximum cross-sectional areas on the 2,500-ton stretcher in the commonly used heat-treatable alloys are:

61S-T4 or T6	—264 sq in.*
14S-T4 or T6	—135 sq in.
24S-T4	—115 sq in.
75S-T6	—115 sq in.

** Limited by stretcher jaw size*

RELATIVE DISTORTION of plates machined after no stretching and after stretching by amounts shown in the tables

STRETCHING SCHEDULE FOR 75S-T6 PLATES, 1¾ IN. THICK

PLATE NO.	TIME BETWEEN QUENCH & STRETCH, MINUTES	TOTAL STRETCH, IN.	PERMANENT SET, %	NECKING, IN.
1	90	3	0.5	Not Measured
2	75	5	1.25	3/32
3	60	7½	2.0	5/32

WITH-GRAIN PROPERTIES OF STRETCHED 75S-T6 PLATES

PLATE NO.	PERMANENT SET, %	ULTIMATE TENSILE STRENGTH, PSI	YIELD STRENGTH (TENSILE) PSI	COMPRESSIVE YIELD STRENGTH PSI	YIELD STRENGTH, T–C	ELONGATION, %
1	0.5	84,050	75,800	78,600	−2,800	11.0
2	1.25	82,150	73,700	72,400	+1,300	9.5
3	2.0	83,300	75,250	73,600	+1,650	10.25

CROSS-GRAIN PROPERTIES OF STRETCHED 75S-T6 PLATES

PLATE NO.	PERMANENT SET, %	UTIMATE TENSILE STRENGTH, PSI	YIELD STRENGTH (TENSILE), PSI	COMPRESSIVE YIELD STRENGTH PSI	YIELD STRENGTH, T–C	ELONGATION, %
1	0.5	82,850	73,400	79,000	−5,600	10.0
2	1.25	82,250	72,300	77,700	−5,400	9.5
3	2.0	83,200	73,500	78,200	−4,700	10.0

machining distortion

W J LAWLER, technical superintendent,
V F BINKLEY, chief metallurgist,
KAISER ALUMINUM & CHEMICAL CORP.
TRENTWOOD, WASH

In stretching, a pull greater than the yield strength of the metal is exerted until a determined percentage of permanent set is achieved. The required stretch, or jaw movement, for a required set can be calculated; however, if insufficient set is achieved, it is possible to restretch until the desired result is obtained.

Maximum flatness is reached after a normal stretch of approximately 0.5%. For effective stress relief, greater stretches, up to 2% permanent set, are required. Where high permanent set is required, the plate is sawed to finished width prior to heat treating and stretching to avoid any possibility of the metal tearing at edge cracks.

Plate receiving a stress-relief stretch, also exhibits more neckdown in width than material given only a normal (0.5%) stretch, so that the sawed plate tolerances must be increased. In the width range between 36 and 48 in., for example, the necessary tolerance is ± 7/16 in.

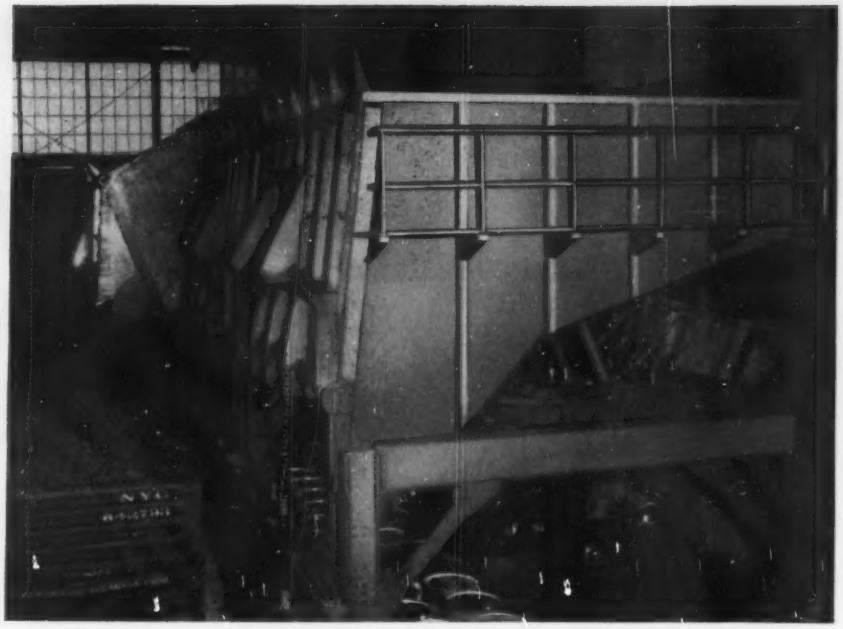
Effects of varying degrees of stretch on 75S-T6 material 1¾ in. thick are given in the tables. Each of the plates was rolled under identical, normal rolling procedures. All were subjected to the same heat-treatment cycle: solution heat-treatment, 60-min soak between 885 and 930 F, followed by quench in cold water; precipitation heat-treatment (artificial aging) after stretching, 4-hr soak at 250 F, followed by 4 hr at 310 F. These are standard cycles for 75S-T6 material.

Although further data remain to be developed, examination of the tables indicates how stretching affects residual properties. Effect of stretching is naturally more apparent in the with-grain tests than in the cross-grain samples because stretching took place in the longitudinal, or with-grain, direction. Nevertheless, stretching effect is still apparent in the cross-grain tests.

A definite trend can be noted with increase in percent of permanent set. Especially noteworthy is the change in the relationship between tensile and compressive yield strengths. Although it is of course not an absolute indication, a comparison of these values serves as a helpful guide to residual stress conditions.

It can be safely concluded that controlled stretching has a measurable effect on residual stresses and therefore will minimize, or even eliminate, distortion during extensive machining operations. It is conceivable that more extensive data may establish resultant distortion as a direct function of the percent of set.

Stretched aluminum-alloy plate, now available in larger sizes, offers an essentially new material to fabricators and is well adapted to a variety of new applications, including shipbuilding, transportation, and light-weight, heavy-duty equipment.



THROUGH THESE PORTALS PASSED 3140 tons of steel, over 1000 tons of iron chips, in 1952. During same year 172,128 gal of cutting oil was delivered to machines in plant; only 40,605 gal was new stock, remainder was reclaimed from the crushed and dried chips. Three bins are Gar Wood units with hydraulic-powered tilt to 45°, hydraulic-powered doors at dump end and in walls across the middles. Bins are split in half, providing six 25-ton storage chambers in which iron and steel can be sorted. Bins provide freeze-proof temporary storage at track-side until car can be spotted for loading

Canny bulk

H W LINDSAY, Wks Manager
L F GRAVES, Wks Metallurgist
ALLIS-CHALMERS MFG CO, La PORTE, IND

Savings because of the chip-handling and oil-reclaiming system come from three main sources: First, the reuse of hydraulic, motor, cutting, and general-purpose oils has reduced consumption of these oils sharply. Second, the large (3200-gal) storage tanks installed allow the buying of oils in bulk, which brings down the price on the oil that must be purchased for makeup. Third, the crushed steel chips have more market value than loose turnings. Crushing the chips also allows the extraction of more oil from them before they are shipped to the scrap dealer.

Successful use of the oil room has been especially profitable. In addition, it has led to more adequate maintenance on machine tools to prevent oil waste. As a result, the amount of oil that must be purchased is in line with percentage figures reported by other companies with successful oil-recovery systems.

how the oil is reclaimed...

Used cutting oil is pumped from the chip room to two sterilizers in the oil room where it is held at 180F by steam-heated coils for 16 to 24 hr. This kills skin-irritating bacteria, evaporates moisture, reduces viscosity so the oil can be filtered easily, and settles out some of the sludge. Each tank takes 1500 gal, but 500 gal must remain in each tank to cover the heating coils, so oil is treated in 1000-gal batches.

Filtration is next. This takes 8 to 10 hr, as the oil is forced through layers of cotton-waste and hair mats by a 100-gph discharge pump. Filter temperature is 140F, held automatically by steam coils. Sludge removed from the oil is taken off the filter cones once a month.

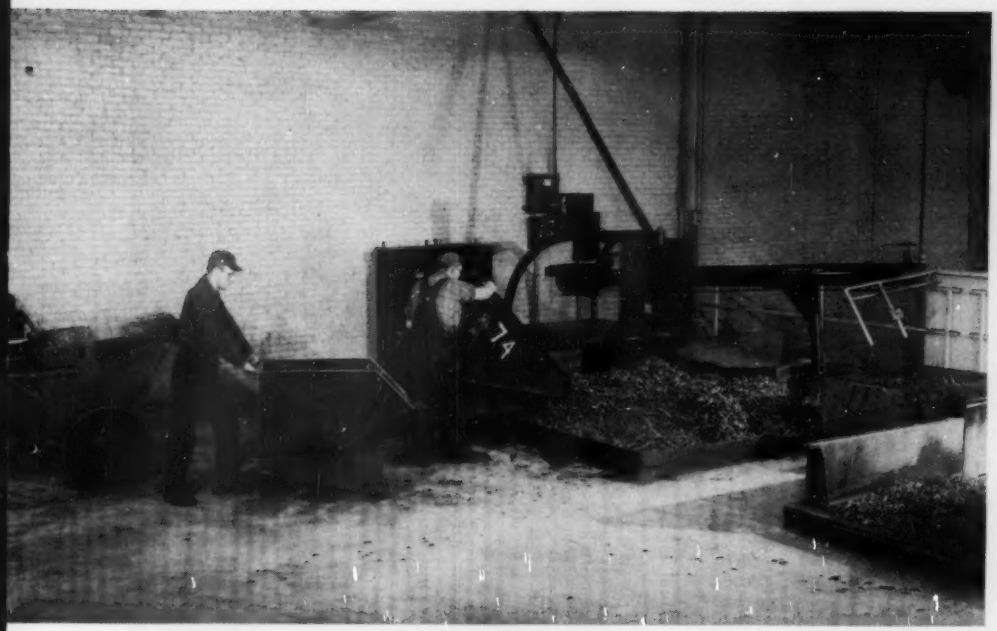
Clean oil is held in the mixing tank, where additions are made if required. Mixing is aided by compressed-air agitation; then the oil is stored.

A new batch of cutting oil is made in the mixing tank by adding 500 gal of paraffin oil (at 140F to ease mixing) to 100 gal of concentrated base oil. This is stored until needed in the plant.

General-purpose lubricating oils, hydraulic oils, and motor oils are filtered and stored in the same oil room. They can be refiltered if necessary, but one pass through the filter is usually enough.

Soluble oils, drained from the floor pan on the balcony, cannot be used over, but must be dumped. To minimize the quantity that must be disposed, the oil is chemically treated in a settling tank; this takes 16 to 24 hr of agitation and 48 hr of settling. Then the water, which separates from the oil and lies under it, is drained to the sewer, and the oil is drained into a tank and taken out of the plant.

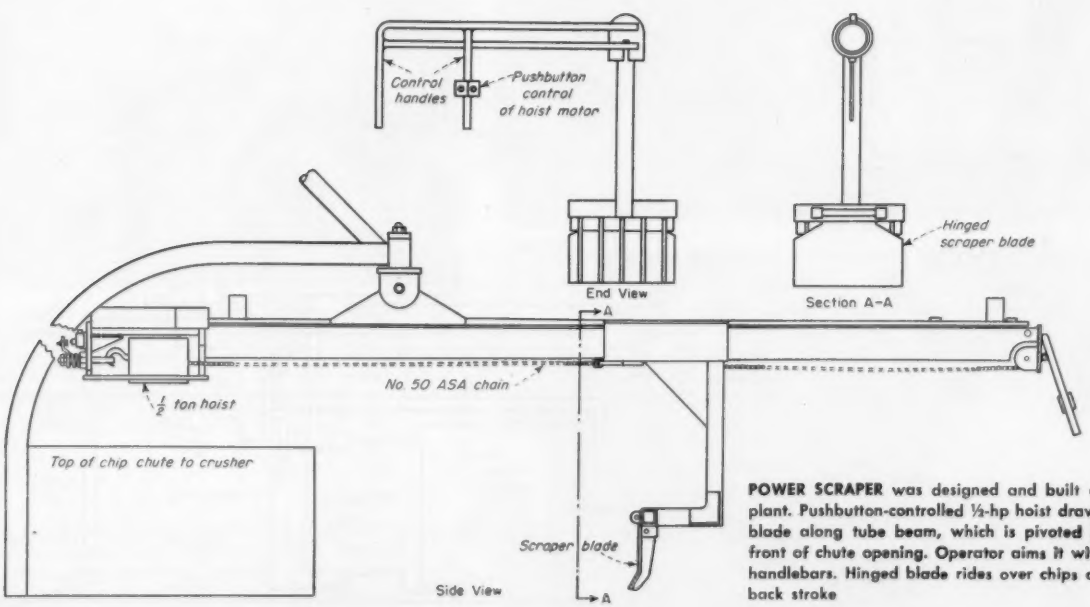
New soluble oil is made up by adding 600 gal of water to 20 gal of the oil base, agitating the mixture for 20 min, then pumping direct from the mixing tank to the dispensing panel as needed.



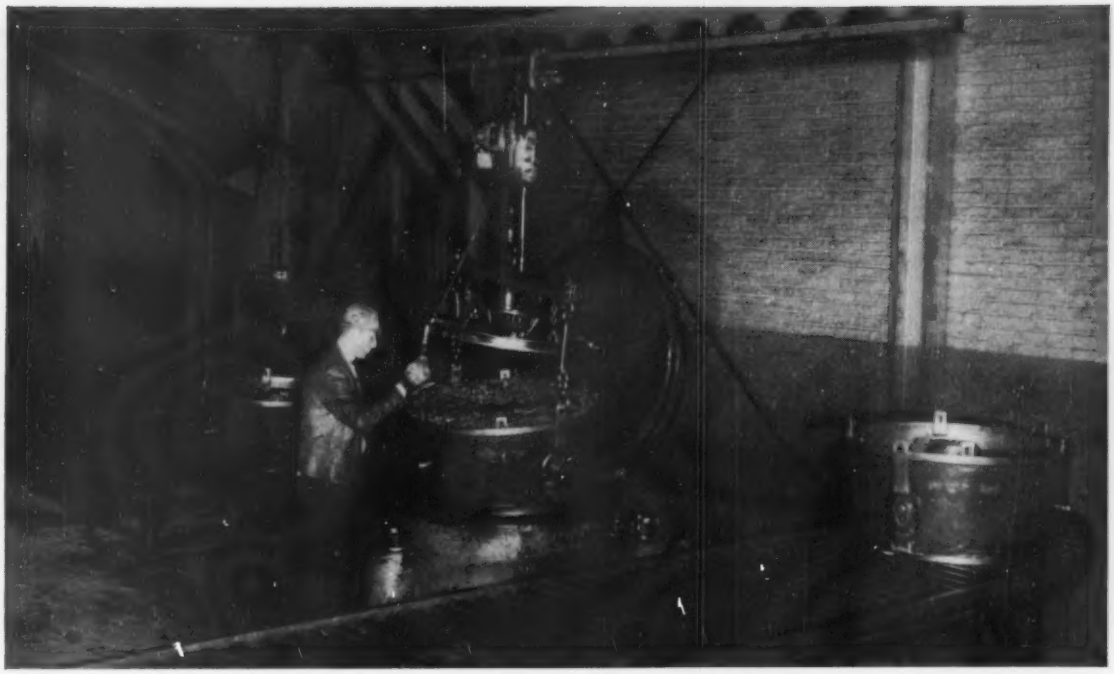
CHIPS ARE BROUGHT FROM MACHINES in tilt-dumping bins, some on pushcarts, some on lift trucks, and unloaded in floor pans on balcony. Two pans allow steel chips to be separated from cutting oil or soluble oil. Power scraper shoves chips to chute opening that leads to crusher on main floor below. Chips are drained for 10 to 15 min if possible to reduce oil carried with them

handling saves chip and oil wastes

Two special features of this oil-recovery and chip-disposal system make it one of the most mechanized to date; trackside chip-storage bins, and an automatic crane that loads them. Handling throughout the system is fast and efficient, producing major economies

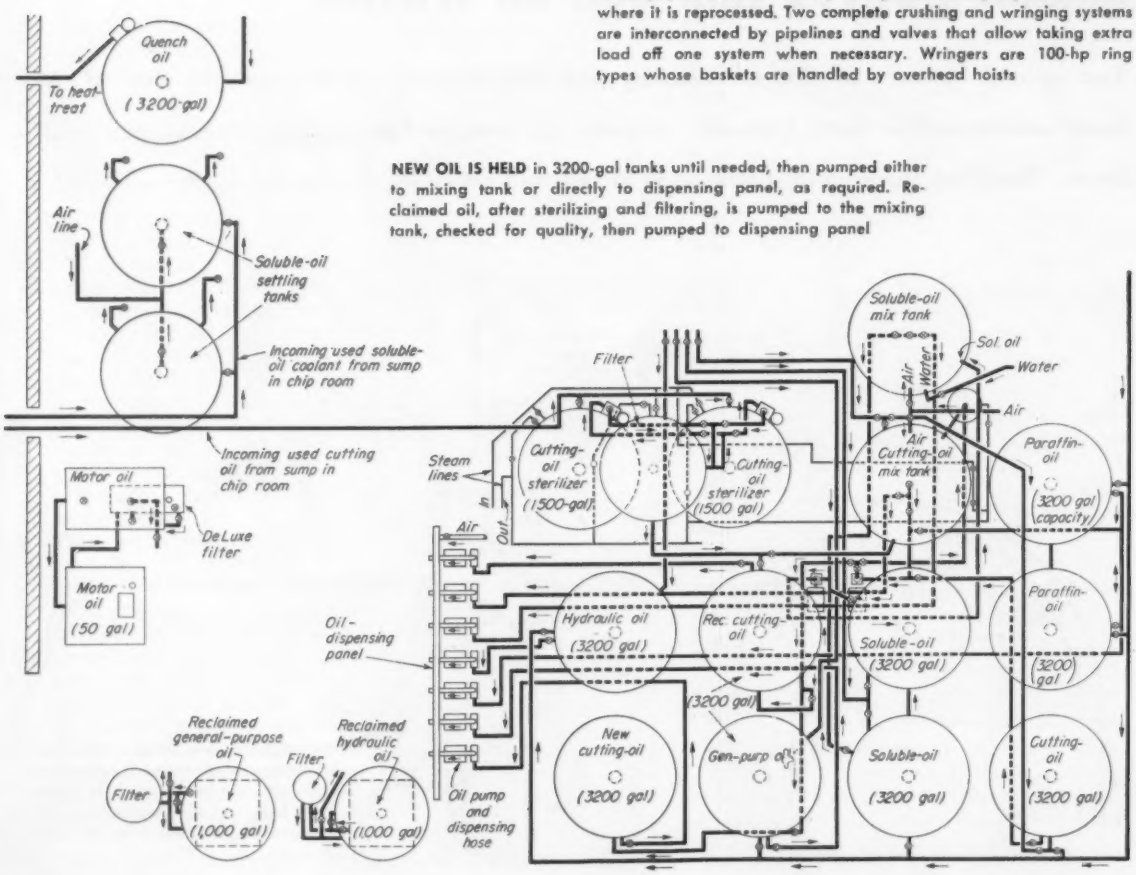


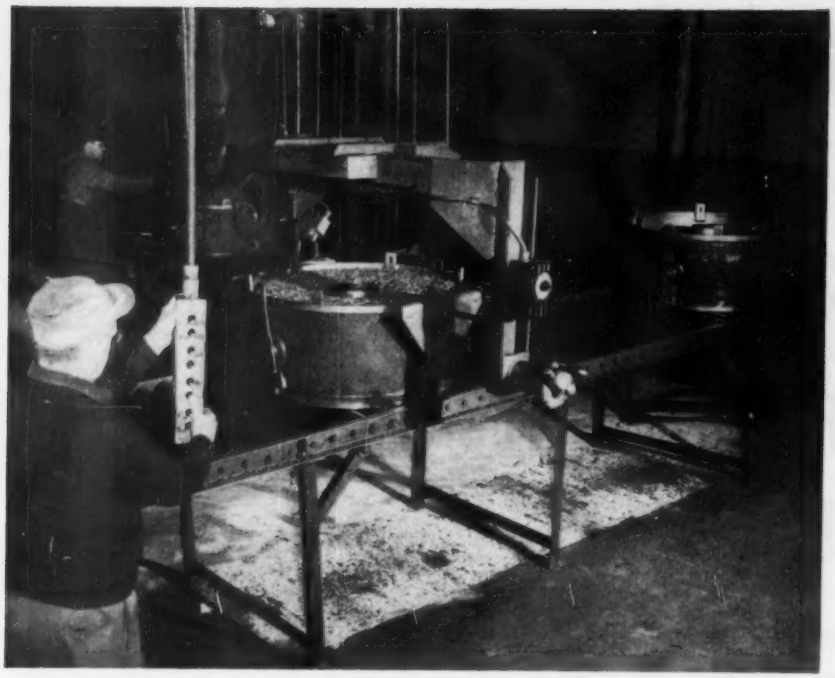
POWER SCRAPER was designed and built at plant. Pushbutton-controlled ½-hp hoist draws blade along tube beam, which is pivoted in front of chute opening. Operator aims it with handlebars. Hinged blade rides over chips on back stroke



CRUSHER DISCHARGES INTO BASKET for Tolhurst centrifuge, which whirls 500-lb load of steel chips for two or three minutes. Oil drops to sump, joins oil from balcony floor pans, and is pumped to oil room where it is reprocessed. Two complete crushing and wringing systems are interconnected by pipelines and valves that allow taking extra load off one system when necessary. Wringers are 100-hp ring types whose baskets are handled by overhead hoists

NEW OIL IS HELD in 3200-gal tanks until needed, then pumped either to mixing tank or directly to dispensing panel, as required. Reclaimed oil, after sterilizing and filtering, is pumped to the mixing tank, checked for quality, then pumped to dispensing panel

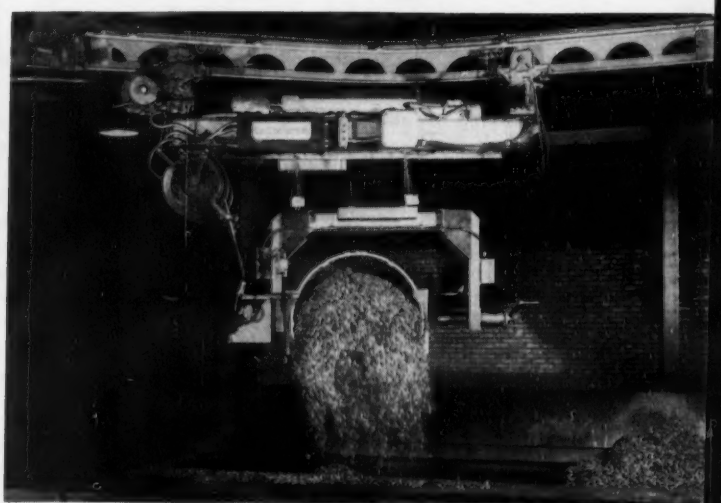




CRANE-LOADING STATION is on roller conveyor that takes empty baskets back to wringer area. Crank at right end of basket carrier is for locking up clamps. Above it is drum switch, which is set to deliver chips automatically to selected bin at railside. Operator starts motion by using pushbuttons in pendant control

CLEVELAND TRAMRAIL MOVES CHIP BASKET to bank of bins, stops at position indicated by drum switch (and limit switches tied in with it), dumps, then returns to loading position without operator control. Crane can stop at any of 12 dumping positions

CAST-IRON AND MALLEABLE-IRON CHIPS are collected on a small floor pan on the balcony above, then dropped in basket loads through the chute to the conveyor. Tramrail picks up full basket and takes it directly to storage bin at trackside



OIL ROOM DISPENSES NEW AND RECLAIMED OILS for cutting, lubricating, and hydraulic systems from 12 King mercury-column gages and 7 pumps. Large tank from Dept 62 will carry cutting oil on power truck; smaller quantities are moved in closed containers

FLEXURE IN REDRAWING. Fig. 1 . . . Reducing a shell, supported by a collar, causes the metal to flow inward 90°, then upward 90°. Fig. 2 . . . Reverse drawing also causes 180° flexure, but in one direction. Fig. 3 . . . Overstressing can occur if the metal is pulled through more than 180°

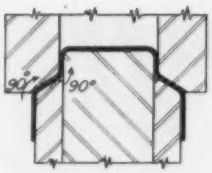


Fig. 1

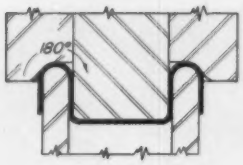


Fig. 2

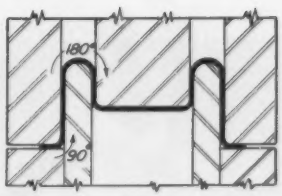


Fig. 3

Cope Talk on Draw Dies...X

REVERSE DRAWING GIVES YOU GREATER REDUCTIONS

If a shell can be reduced 20% by ordinary methods, you can get up to 25% reduction by turning the shell inside out

STANLEY R COPE, president, ACME SCHOOL OF DIE DESIGN ENGINEERING, SOUTH BEND 1, IND

Reverse drawing means turning a shell inside out to reduce its diameter. By this operation it is possible to reduce the diameter of a shell by approximately 25% more than is possible with ordinary redrawing dies. Other advantages are: (1) the metal in the walls is subject to less strain and thins less, and (2) it is almost impossible to form wrinkles.

Analysis of metal flow reveals why reverse drawing is preferable. When a shell is supported by a collar (Fig. 1) during redrawing, the metal is flexed in two different directions. It is forced to flow inward over a 90° corner on the draw collar and then upward over another 90° corner into the die. When a shell is turned inside out to reduce its diameter (Fig. 2), the metal is flexed in only one direction.

With both types of dies the metal flows around corners that total 180°. This is the maximum number of degrees through which the metal can move in one redrawing operation. If an attempt is made to pull the metal through more than 180° (Fig. 3) the metal will be overstressed and the shell may break. Remember this because in some types of reverse drawing dies two distinct drawing operations are performed with a single press stroke. When two drawing operations are performed in the same die, the die must be designed to draw the first shell completely off before the second drawing punch descends to reduce its diameter.

DESIGN OF REDRAWING DIES

There are three general types of reverse drawing dies. For a small, thick-walled shell, use a die like that shown in Fig. 4. This simple die is mounted on an open dieset.

If the shell is large or the metal is thin, a draw ring must be used to prevent the metal from wrinkling or getting out of control when the end of the shell passes over the top of the die. Fig. 5 shows how a draw ring is applied to a single-action die. In operation, the shell is placed bottom down in a nest machined in draw ring *A*. The draw ring is normally held above punch *B* by pressure pins *C*. When the slide descends die *D* slips into the shell and presses it against the draw ring. The shell and the draw ring are then forced downward and punch *B* turns the shell inside out. When the slide rises the shell is carried up in die *D*, and is ejected near top stroke by knockout plate *E* and rod *F*.

Fig. 6 shows a die equipped with a draw ring and intended for use in a double-action press. The shell is placed bottom up over die *A*. When the press is tripped, ring *B*, which is attached to the blankholder slide, descends and presses the bottom of the shell against the top of the die. Punch *C* then descends and turns the shell inside out. The shell is disposed of through the press bed.

DRAWING A SHELL-WITHIN-A-SHELL

All three dies illustrated in Figs. 4, 5 and 6 are designed to draw the shells all the way off; that is, with straight walls and without any portion of the original shell remaining on the completed stamping. By

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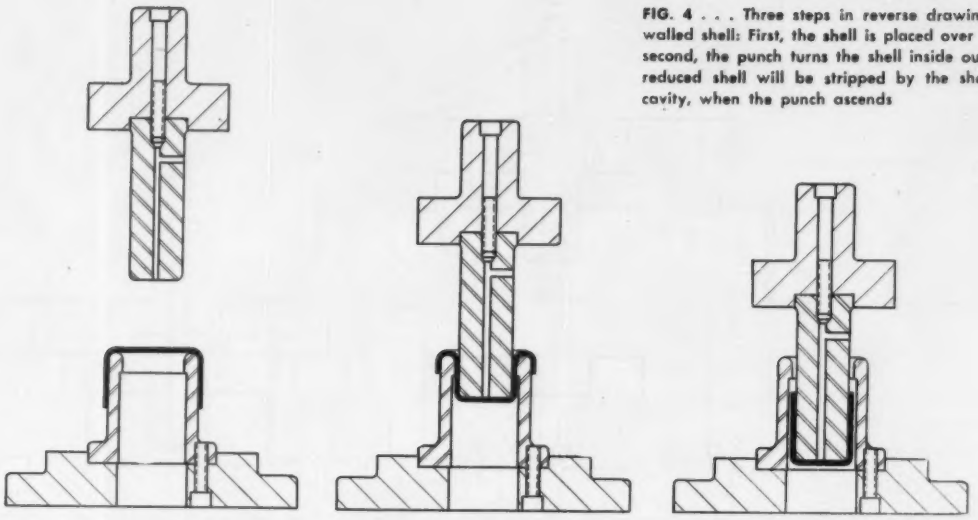


FIG. 4 . . . Three steps in reverse drawing a small thick-walled shell: First, the shell is placed over the die member; second, the punch turns the shell inside out; and third, the reduced shell will be stripped by the sharp edge in die cavity, when the punch ascends

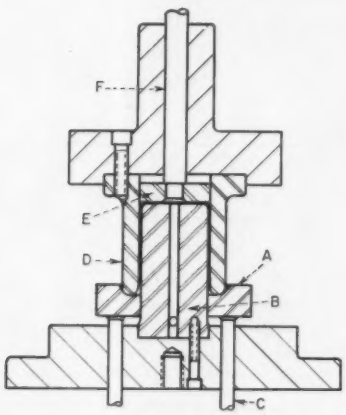


Fig. 5

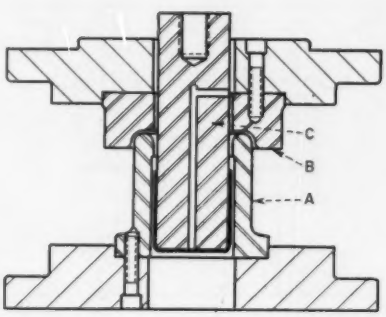


Fig. 6

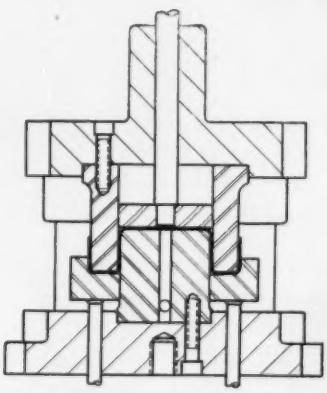


Fig. 7

FIG. 5 . . . Large, thin shell is shown at end of reverse drawing in single-action die. Draw ring *A* and sleeve-type die *D* are required to prevent wrinkles. Fig. 6 . . . Die for double-action press has a similar draw ring attached to the blankholder slide. Fig. 7 . . . By modifying the draw ring and the stroke, such dies can be used to produce a shell within a shell

changing the design slightly any of these dies can be used to turn the shell partially inside out and produce a shell-within-a-shell, as shown in Fig. 7.

Round inner and outer shells of any size or cross-section can be produced by this method. The outer shell is always drawn first, then reverse drawn to produce the inner shell. If the inner shell is small in diameter, and deep in relation to the outer shell, one or more additional reducing operations are required to bring the inner shell to its final diameter, as shown in Fig. 8.

When additional reducing operations are required, the shell is reverse drawn to as small a diameter as possible and to a depth that will provide just enough metal for the finished shell. The diameters and the heights of the remaining shells are then computed in the same manner as described for wide-flanged shells (*AM*—Jan 4, 1954, p 100). The outer shell is ignored.

Dies for reducing reverse-drawn shells are similar to those employed for reducing plain wide-flanged shells. If the metal is comparatively thick, and not subject to wrinkling, a die similar to that shown in Fig. 9 can be used. In operation, the outer shell is placed over die ring *A* and is permitted to drop down over the outside of the ring until the bottom of the inner shell rests on top of the die. When the slide descends, punch *B* strikes the bottom of the inner shell and reduces the diameter by forcing it into the die. The outer shell simply slides down farther over the outside of the ring and is not affected by the operation. Ring *C* is arranged to strike the shell at bottom of the stroke to flatten out any wrinkles or buckles that may form during

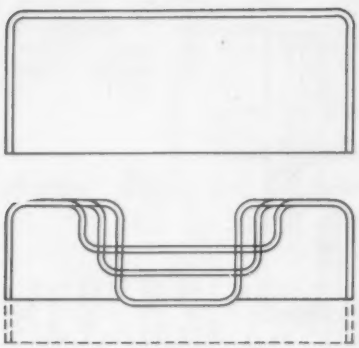


FIG. 8 . . . When the inner shell is small and deep in relation to the outer shell, additional reducing operations are often required for the inner shell

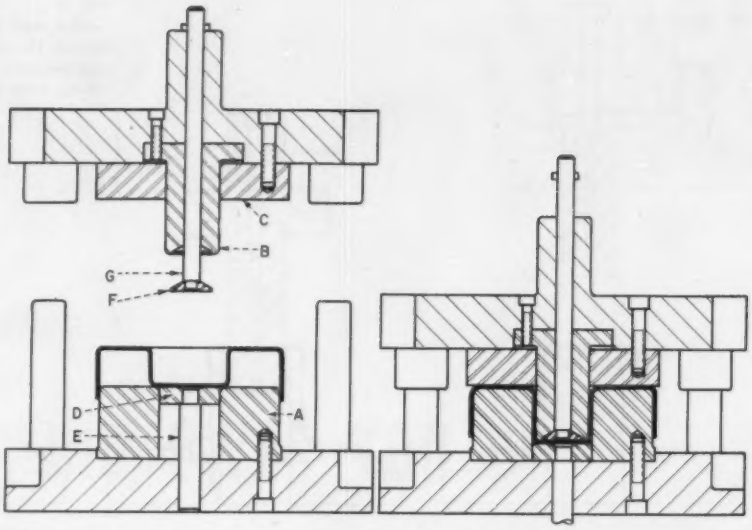


FIG. 9 . . . Outer shell of comparatively thick stamping needs no support while the inner shell is reduced. Ring C will flatten any wrinkles that form on the bottom

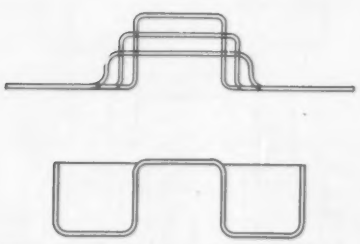


FIG. 10 . . . Two-walled shells can be made by drawing the inner shell first, but this procedure has several disadvantages

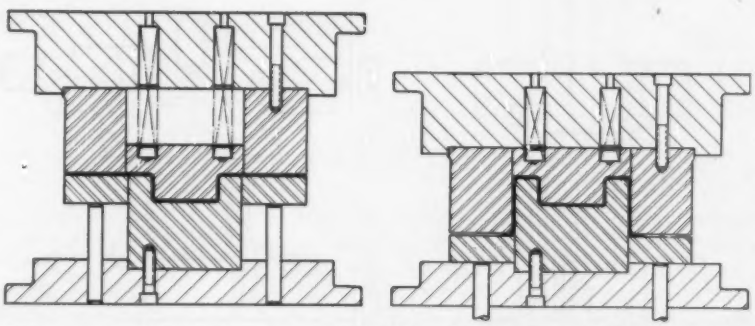


FIG. 11 . . . An aid to drawing the inner shell first is a draw ring operated by an air cushion with automatic control. After the shell has been completed, the draw ring must stay down until the knockout plate strips the shell from the upper die

the operation. This precaution is always necessary on the last reducing operation, but may not be necessary for preliminary reducing operations.

When the slide returns to the top of the stroke, knockout plate *D* and rod *E* eject the work from the die, and the shell is carried up by the punch. It is stripped from that member near the end of the stroke by knockout plate *F* and rod *G*.

If the metal is thin, the inside of the shell should be supported by a collar during the reducing operation.

Two-walled shells are occasionally produced by drawing the inner shell first, then drawing the outer shell, as shown in Fig. 10. Ordinarily it is not advisable to produce shells by this method for two reasons: First, it is more difficult to draw metal into the inner shell from the outside of a large flat blank than it is to draw the metal from the walls of a previously drawn shell. Consequently, more operations are required and the metal is subjected to greater strain. Second, it is difficult to hold the inner shell and prevent the metal from being pulled back into the walls of the outer shell when the outer shell is being drawn.

A spring-backed knockout plate with long springs must be provided to enter the inner shell before the outer shell starts to draw, as shown in Fig. 11. The draw ring must be operated by an air cushion equipped with an automatic pressure control. This control shuts off the air and prevents the draw ring from rising until the shell has been ejected from the upper die by the knockout plate. When the shell has been ejected from the die the air is automatically turned on to strip the shell from the punch. An ordinary air cushion can't be used for this operation because the finished shell might be crushed between the knockout plate and the draw ring. Comparatively few air cushions are equipped with pressure controls, and this makes the drawing of the inner shell first even more impractical.

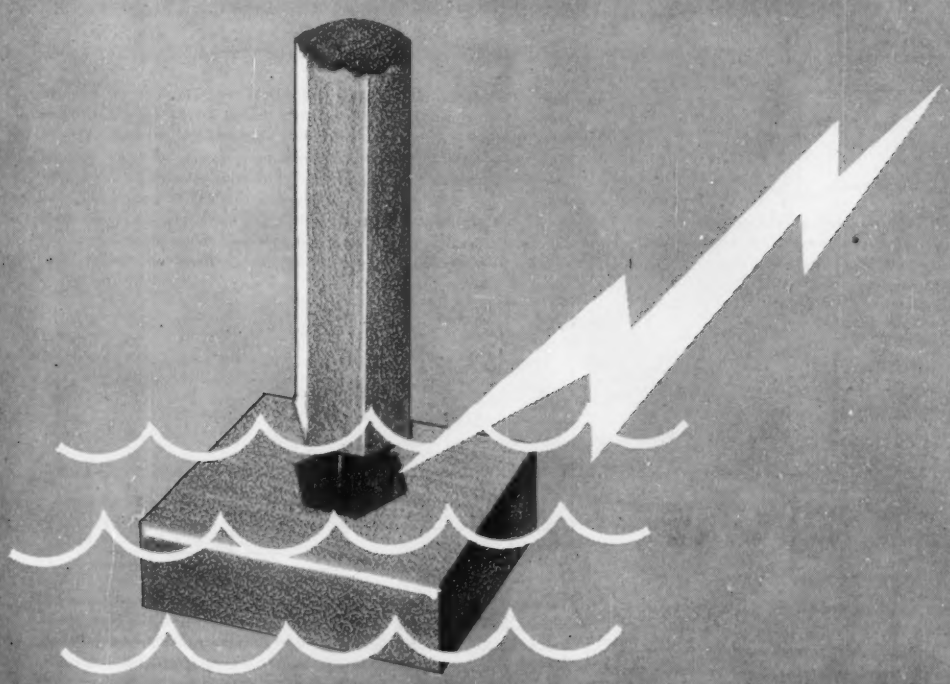
Part XI will appear in an early number.

American Machinist
SPECIAL REPORT
NUMBER 356

electrical-discharge machining

This most comprehensive report ever published on arc machining —now called "electrical-discharge machining," tells what the process is, how to use it, and where it can be applied in fabricating the materials that are virtually unmachinable

H V HARDING, technical assistant to the president
V E MATULAITIS, chief engineer
R C STOKE, director of technical field service
ELOX CORP OF MICHIGAN, CLAWSON, MICH



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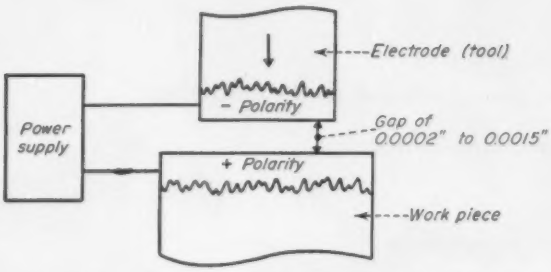
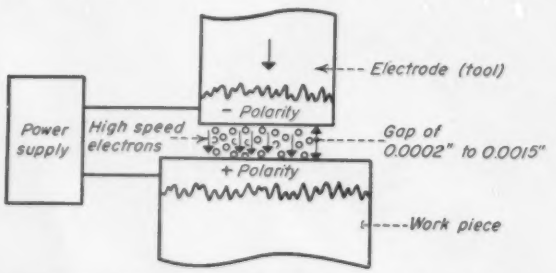
How electrical-

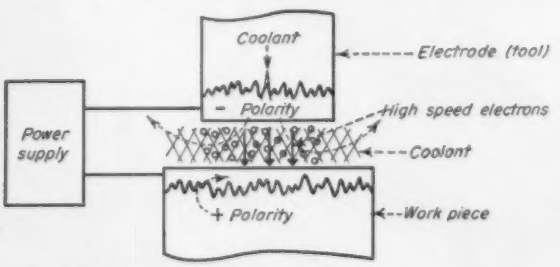
Not a complicated process, electrical-discharge machining is a series of discharges occurring between a tool or electrode, shaped to the desired dimensions of the hole or cut desired, and the work. The rate of discharge varies between 20,000 and millions per second. It can be maintained at any predetermined setting to give the desired cutting speed, accuracy, and finish.



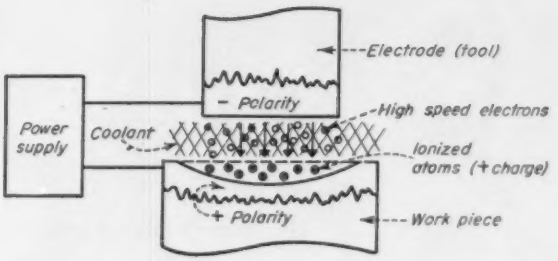
TO UNDERSTAND HOW METAL is removed we need only see what happens during a single discharge and multiply the result by the frequency. Each discharge is a complete machining operation. Voltage builds up gradually between the electrode and the work. As this happens, electrons (negative charge) pile up on the surface of the electrode.



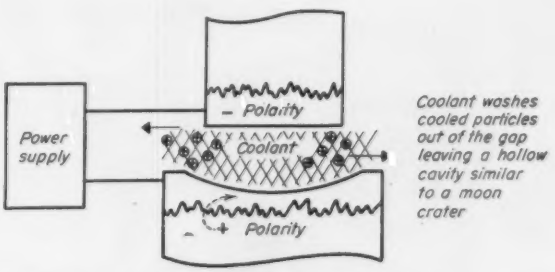
STRESS BECOMES SO GREAT that electrons crash through the surface barrier of the electrode and speed toward the work with extremely high acceleration. A single discharge, which always occurs between the closest points of electrode and work, consists initially of billions of moving electrons.



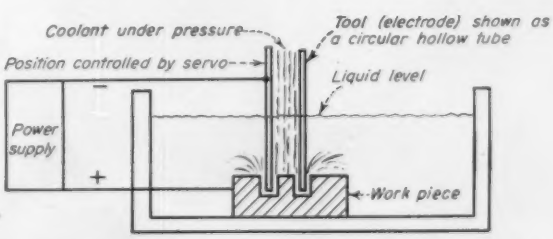
DISCHARGE ALMOST ALWAYS TAKES PLACE in the presence of a dielectric coolant, and here we see the same stage in the operation with the coolant included, supplied, in this case, through a hole in the electrode. Voltage at which discharge occurs is controlled by the spacing between electrode and work. It is extremely repetitive if this spacing is accurately held.



WHEN THE ELECTRONS strike the work they agitate the surface by bombarding the molecules. A small portion of the surface is instantly heated to the point of vaporization. At the same time, some electrons strike atoms of the work and knock electrons from their orbits, leaving the work with a net positive charge.

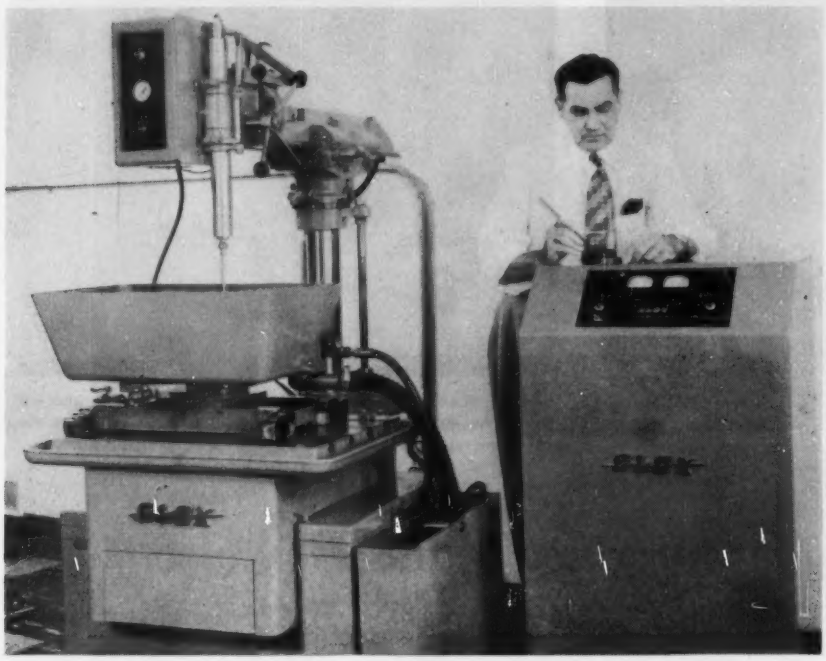

– Polarity
Power supply
Coolant
+ Polarity
Coolant washes cooled particles out of the gap leaving a hollow cavity similar to a moon crater

PARTICLES OF SUPERHEATED METALLIC VAPOR with a positive charge are attracted by the negative charge of the electrode. Since these particles are now movable they start toward the electrode. As they move through the coolant they cool rapidly and are washed out of the gap by the coolant flow. Power is shut off at the proper point so that only the metal removed is heated. This completes one cycle—one complete machining operation. As thousands of separate such discharges occur per second they can remove material rapidly without ever heating the work even though they vaporize the material that is removed.

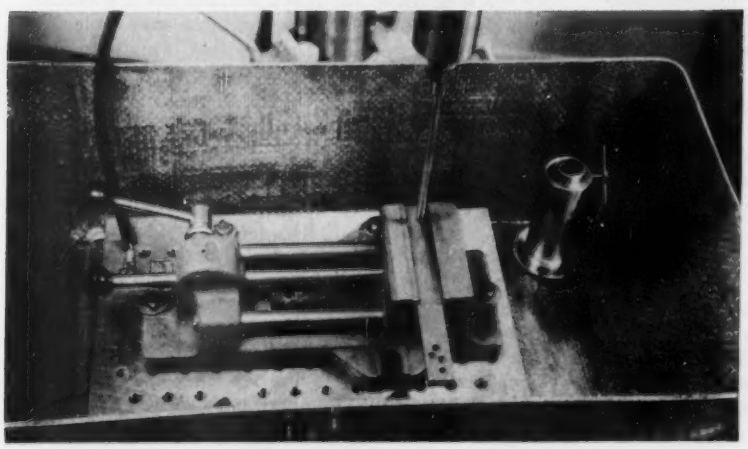


TO MAKE A PRACTICAL OPERATION of this principle, the work is placed in a tank and covered with the dielectric fluid. The tool or electrode is preferably hollow so that coolant under pressure can be forced through the gap. To maintain the proper gap, the electrode is held by a sensitive servo-mechanism that moves the tool to hold the predetermined gap at all times.

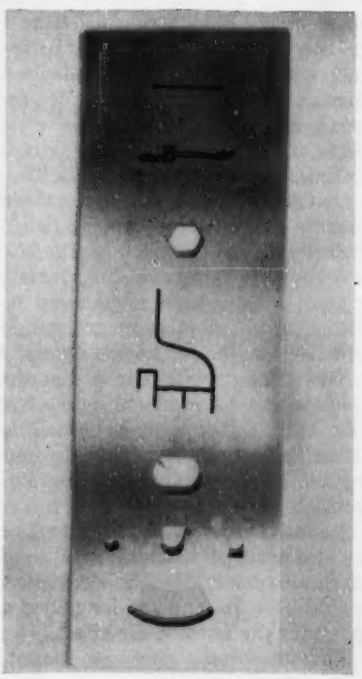
discharge machining works



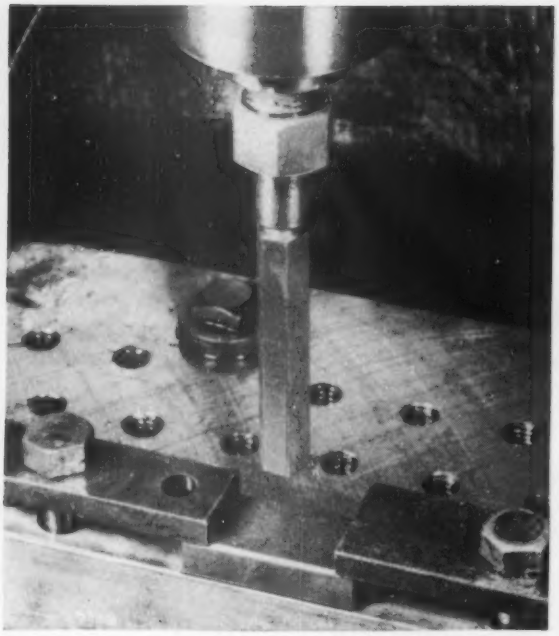
A BASIC MACHINE for electrical discharge machining is Model M400. It consists of a power pack and a machine with adjustable table and oil pan for mounting the work and a spindle and servo-mechanism for the electrode



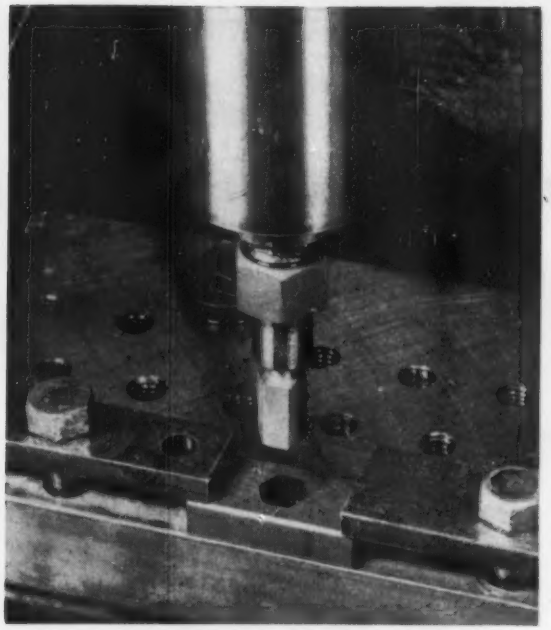
TYPICAL SETUP in the oil pan of the M400. Electrode of ¼-in. hollow brass is mounted in a precision collet on the end of the movable quill. Work is ¼x1-in. tungsten carbide. Four holes at the near end of the work have been drilled with this electrode



VERSATILITY OF PROCESS is indicated by sample plate of ¼-in. ground tool steel. The slot, the shaped cavity, and the extrusion port were all made with solid-brass formed electrodes. The shaped holes, except the crescent-shaped hole at the bottom, were all made with solid-brass electrodes through which a coolant hole had been drilled. The crescent hole was trepanned with a formed sheet-brass electrode to minimize stock removal



SHAPED ELECTRODE made from a free-machining brass and ground to exact size required is mounted in machine collet. The die block is located on the table and clamped in place



SHAPED HOLE is cut in the carbide die block. A similar piece of carbide for the stripper plate is then mounted on the table and the operation repeated with the same electrode

How to produce a dieset by electrical-

Completely different procedures must be developed for electrical-discharge machining in comparison to the conventional methods. To better understand the differences, consider the sequence of operations in making a matching punch, die, and stripper-plate set from tungsten carbide.

The material is a tungsten-carbide punch-and-die material such as Carboloy 55B. The die hole is to be a hexagonal shape, each flat surface to be 0.2102 in. point to point. Across any two flats the distance is to be 0.364 + 0.001 – 0.000 in. Die blank is ⅜x¾x1½ in. and has a taper for slug clearance of 0.001 in.

The punch is to be made from ½-in. round stock with a ⅜-in. effective length to match the die. This effective length is to have a reverse taper of 0.001 in.

The stripper plate is to be the same size as the die block with a ½-in. round hole blending into the hex hole 3/32 in. from the bottom. The round hole receives the round portion of the punch and the hex section provides clearance for the punch to pass through.

To make this set the only tool required for electrical-discharge machining is an electrode of free machining brass. The shaped section of the electrode should be 4 in. long and machined and ground 0.001 in. under the finished die size.

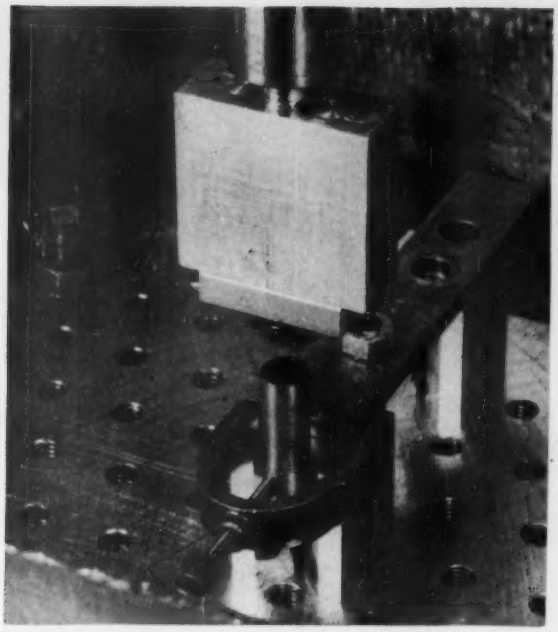
First machining step is to mount the electrode in the machine collet and check for straight line motion, then clamp the die block to the table over a block in which a blind hole has been drilled. This hole must be large enough to receive the electrode when it breaks through the die block to retain the coolant pressure at about 60 psi.

Machine settings for the first cut are "Fine" on the power-feed head and Tap 4 on the power pack. A single pass will complete the shaped hole in the die block.

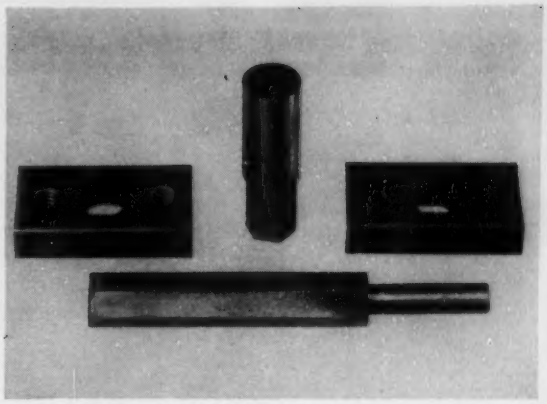
A second piece of carbide is then located on the table in the exact position of the die block and clamped. Electrode position must not be changed or a new setup will be required.

Setting on the power-feed cabinet is changed from "Fine" to "Coarse" and the second piece of carbide is cut. This hole will be about 0.00025 in. larger than the one in the die block because of the changed setting. This second block will serve as the stripper plate and also as the electrode to make the punch.

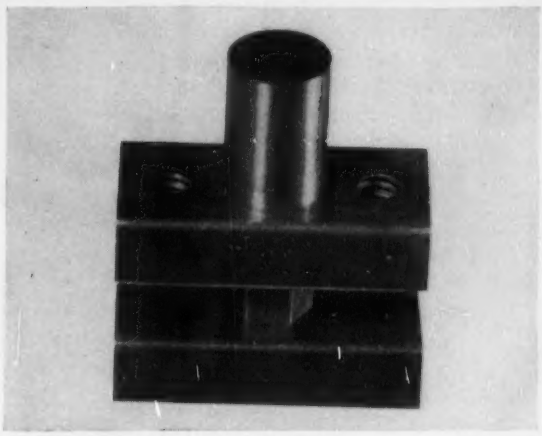
A brass holder is made to hold this stripper plate, provided with a hollow stem for coolant and an adapter to fit the collet of the machine. The stripper plate, which has a tapered hole, is clamped to this adapter with the small end of the hole down and in a position with the hole directly under the coolant hole in the adapter.



STRIPPER PLATE SERVES AS TOOL to cut carbide punch. Stripper is attached to the bottom of adapter mounted in collet and punch blank is mounted on bed. In cutting operation, stripper cuts hexagonal form on punch while punch cuts round hole in stripper



COMPLETED PUNCH, DIE, AND STRIPPER PLATE with a brass tool like the one used to form them. Tool is consumed in cutting operation



ASSEMBLED SET of punch, die, and striper plate has matching shapes within 0.0005 in. without lapping or barbering

discharge machining

Punch blank is clamped to the machine bed in a V-block so that it is held vertically directly under the hexagonal hole in the stripper plate. In this setup the stripper plate serves as the electrode and the punch blank serves as the work. However, because electrical-discharge machining causes erosion of both work and electrode, the punch will cut a round hole in the stripper plate at the same time that the stripper plate cuts the hexagonal shape on the punch. Study of the illustrations will indicate the manner in which this happens.

Controls are set at Tap 4 and "Fine" as in the original cutting of the die block and the machine is started. As the operation procedes, the punch takes on the hexagonal shape of the stripper plate from the top down and the stripper plate takes on the round shape of the punch from the bottom up, with the transition marked by a smooth blending of the two shapes. Cutting is stopped when a 3/32-in. hex portion remains in the stripper plate. At this time about ½ in. of hex punch will protrude upward through the stripper plate.

To assemble the set, place the die block on the bench with the small end of the hole up. Remove the stripper plate from the adapter and place it on the die block with the hex hole down. Now remove the punch from its clamps, invert it, and insert in the round hole in the stripper plate until the hex end enters the hex part of the stripper and the die block.

There are several unorthodox features to this set, but they provide certain advantages. Principal of these is the ability to maintain exact punch-to-die clearance throughout the grind life of the set. There is a taper of approximately 0.00075 in. for slug clearance in the die and a taper of 0.00075 in. in the opposite direction in the punch. When it is necessary to grind off the die for sharpening, this will slightly enlarge the hole. Removing the same amount of stock from the end of the punch will enlarge it by the same amount and maintain the fit between punch and die. As the tolerance for the punched hole was +0.001 in. and the taper of punch and die are 0.00075 in., they can be completely used up within the allowable tolerance. If it is necessary to alter the clearance between punch and die, this can be accomplished by removing more material from either the punch or the die than from the die or the punch, as required. In addition, it should be remembered that initial clearance between punch and die can be varied by setting machine to cut more or less clearance.

Cost comparison of conventional and electrical-discharge machining

The following average costs are for the production of the punch, die, and stripper plate described on the previous pages when produced by conventional methods in steel, conventional methods in tungsten carbide, and electrical-discharge machining in tungsten carbide. All costs include labor and material.

CONVENTIONAL METHOD IN STEEL:

Punch, starting with tool steel bar

1. Turn OD, leaving grind stock
2. Mill hexagonal shape, leaving grind stock
3. Heat-treat to desired hardness
4. Grind OD of shank to desired size
5. Grind hexagonal shape to finish size
6. Sharpen punch
7. Clean up and finish shank end of punch

Punch cost: $16.00

Die block

1. Shape die block, leaving grind stock
2. Rough in the form by drilling and filing to layout
3. Using the punch as a broach and finishing with die filer, match the punch to the die
4. Harden die block
5. Grind die block to size
6. Lap or hone clearance and taper in die block

Die block cost: $35.00

Stripper plate

1. Shape stripper plate, leaving grind stock
2. Open up back clearance for punch by drilling
3. Put in die form by drilling and filing, allowing for heat-treat shrinkage
4. Harden stripper plate
5. Grind OD of stripper plate

Stripper plate cost: $20.00
Total cost: $71.00

CONVENTIONAL METHOD IN TUNGSTEN CARBIDE:

Punch

1. Rough grind punch form with silicon-carbide wheel
2. Finish grind punch form with diamond wheel

Punch cost: $65.00

Die block

1. Rough grind two halves of die simultaneously with silicon-carbide wheel
2. Rough grind two halves of hexagonal form simultaneously
3. Finish profile forms with diamond wheel

Die block cost: $138.00

Stripper Plate (tool steel)

1. Shape stripper plate, leaving grind stock
2. Open up back clearance for punch, by drilling
3. Put in die form by drilling and filing, allowing for heat-treat shrinkage
4. Heat-treat to desired hardness
5. Grind OD of stripper plate

Stripper plate cost: $20.00

Die-retainer plate

1. Shape plate
2. Mill cavity to press-fit size

Die-retainer cost: $15.00
Total cost: $238.00

ELECTRICAL-DISCHARGE MACHINING IN TUNGSTEN CARBIDE:

Electrode

1. Shape electrode from free-machining yellow brass
2. Drill coolant hole in electrode
3. Grind to finished size across flats

Electrode cost: $6.00

Die block

1. Cut die shape in standard rectangular die block with brass electrode

Die block cost: $9.50

Stripper plate

1. Cut stripper plate to preliminary shape from standard carbide block with same electrode

Stripper plate cost: $9.50

Electrode adapter

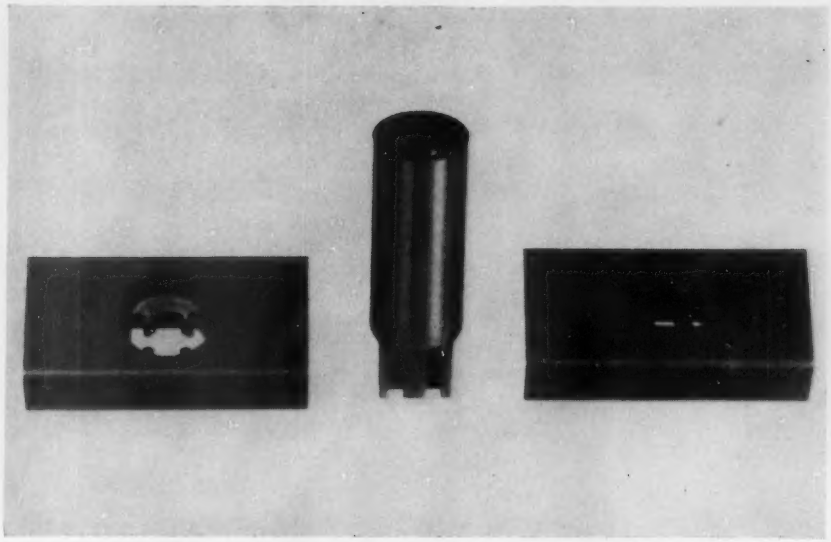
1. Shape electrode adapter from free machining brass to hold stripper plate as an electrode
2. Drill coolant hole in adapter

Adapter cost: $3.00

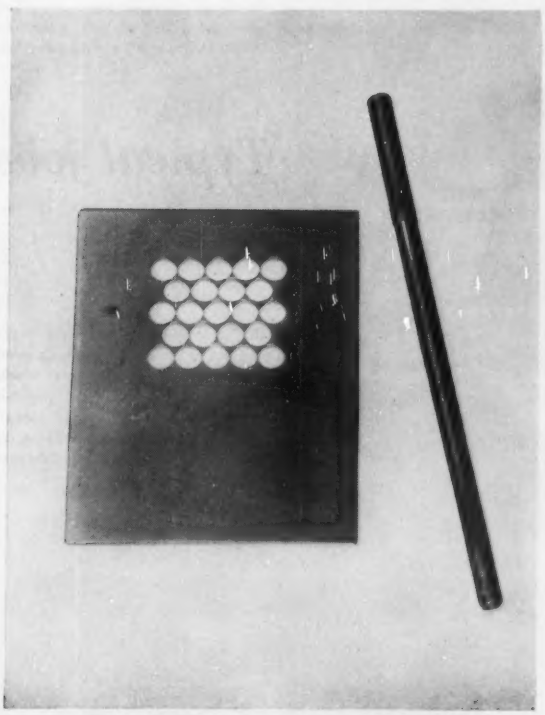
Punch

1. Cut punch using stripper plate as electrode, at the same time finishing stripper plate

Punch cost: $7.00
Total cost: $35.00

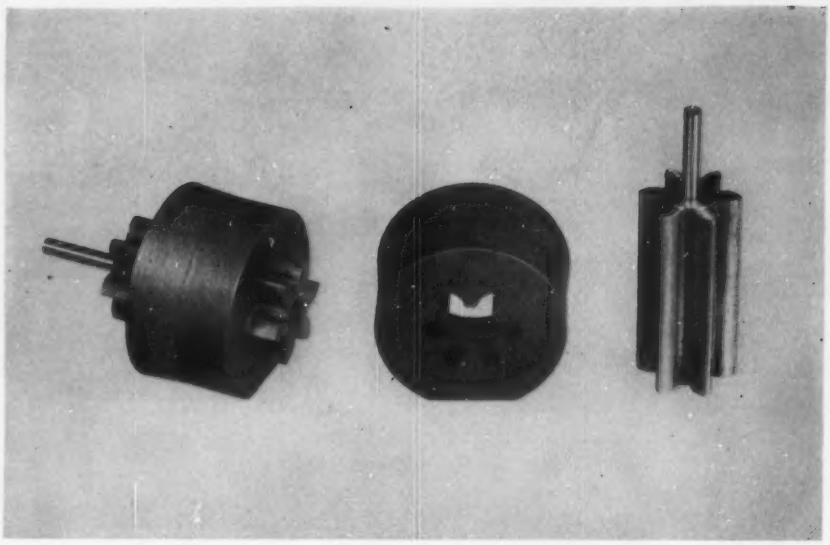


PUNCH, DIE, AND STRIPPER PLATE of different design were produced in carbide by the technique just outlined for a hexagonal punch. This is a shape that could hardly be produced in carbide by orthodox methods

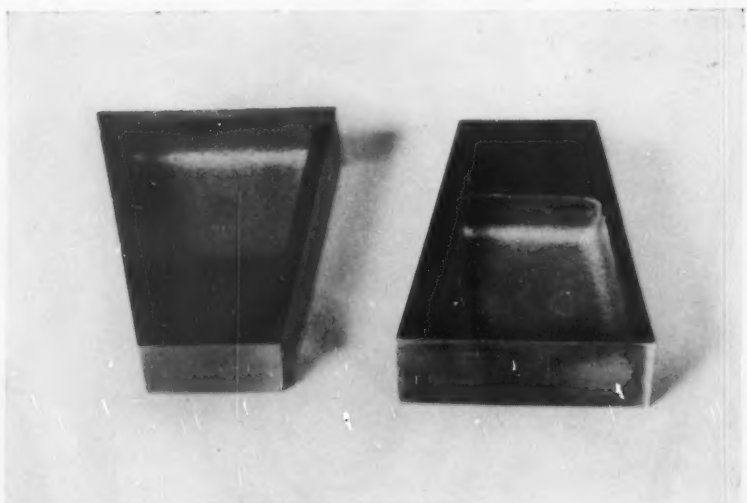


CLOSELY SPACED HOLES in material that work hardens are difficult to punch or drill accurately. In the case illustrated, tens of thousands of precise holes were required in stainless-steel sheet. Holes were to be 0.040 in. apart and each hole was to be concentric within 0.0003 in. Stock thickness varied from 0.010 to 0.090 in. Punching or drilling caused stretching of the plate and resulted in severe distortion of the web. This necessitated such secondary operations as reaming, reforming distorted holes, and deburring. With electrical-discharge machining, it was possible to reduce the web from 0.040 to 0.008 in. without causing warping, distortion, or internal stresses. Secondary operations were thus eliminated. Holes of 0.160-in. dia were drilled in 0.090-in. aluminum in 4 sec and in high-chrome stainless steel in 8 sec

BLIND HOLES are frequently required in heading dies. This carbide bolt die was sunk with a brass electrode like that shown with the die. Tolerance was held to ± 0.001 in. and the time required was 55 min



"BROACHING" can be performed in the same operation as initial shaping of the part. This internal gear was cut with an electrode that had been stepped down by deplating about 0.002 in. from the lower half of the electrode. After the initial undersize hole had been sunk through the work, the electrode was advanced until the finish size approached. Controls were adjusted to fine finish, and the electrode cleaned up the cut to finished size similar to the operation of a standard broach



Typical jobs

DIE CAVITIES can be formed in hard metal without annealing or changing the basic structure of the material. Cavities in these blocks of Stellite were sunk with a brass electrode providing the required radius on all corners and edges. Hardening dies before sinking the cavity eliminates problems with die distortion

Previous articles on equipment and methods for electrical-discharge machining

Machining by Erosion, *AM*—Dec 18, 47, p120

Carbide Problems in Contract Tool and Die Shops, *AM*—Mar 5, 51, p172

Method X Machines Carbides by Atom Expulsion *AM*—Sept 3, 51, p194

Arc Machining Makes Hard-to-Cut Jobs Easy, *AM*—Mar 3, 52, p136

New Processes Will Machine the Unmachinable, *AM*—Mar 17, 52, p155

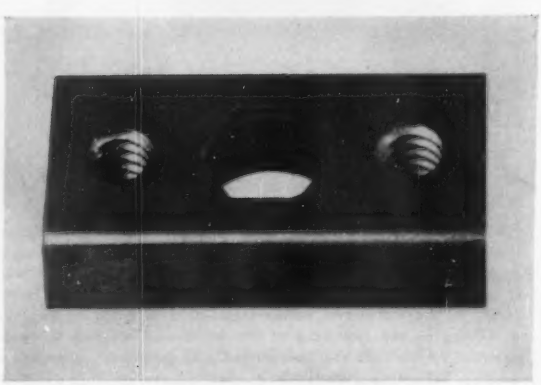
Electrolytic Grinding, *AM*—Nov 10, 52, p155

Elox M300 Electron Drill, *AM*—Dec 22, 52, p170

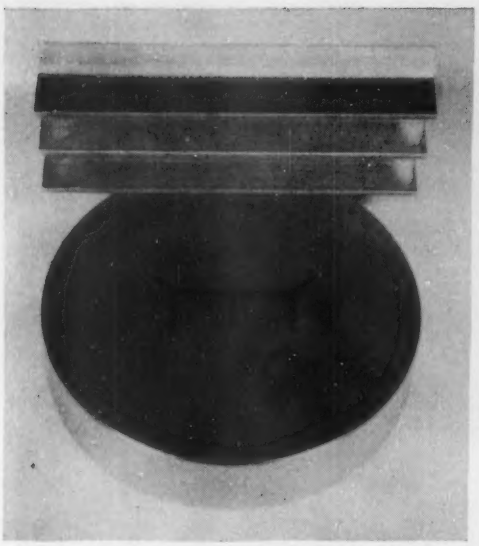
Spark Machining Unit by Sparcatron, *AM*—May 25, 53, p172

Metalmaster Disintegrator Available in Three Models, *AM*—Aug 31, 53, p139

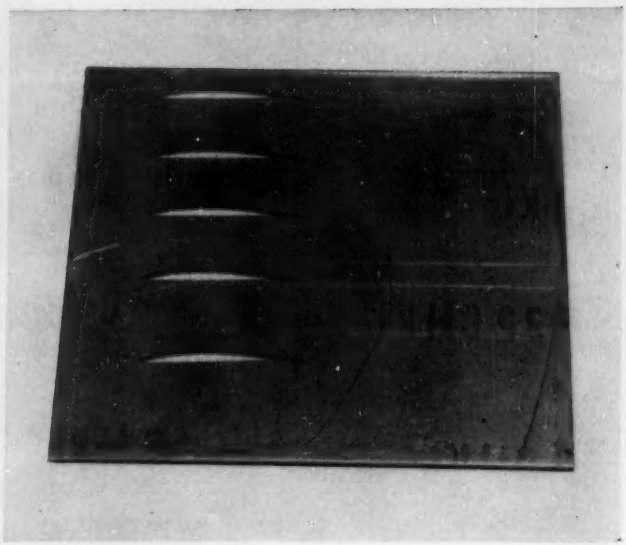
Elox M400 Electrical Discharge Machine, *AM*—Oct 12, 53, p125



THREADING in hardened tool steel, carbide, and other hard materials is possible with a simple adaptation of the equipment to handle a brass tap. Holes in this carbide stripper plate were threaded in a few minutes

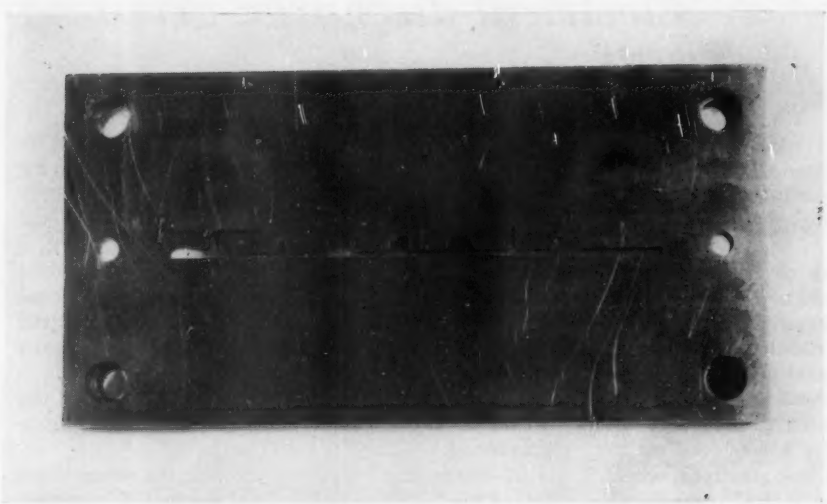


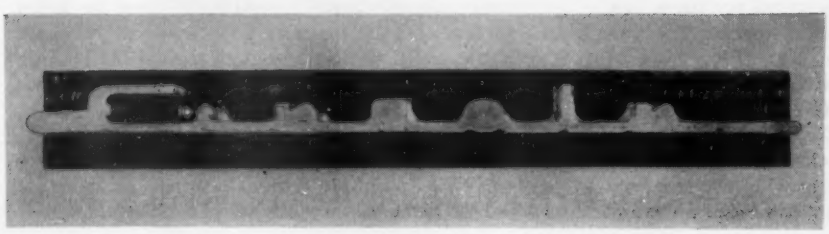
EXTRUSION DIES can be made in the same manner by cutting the cavity undersize and cleaning up to size with the same electrode serving for both operations. Because there is always a slight taper in work cut by electrical-discharge machining, the die is cut from the back, giving the relief taper required in extrusion dies



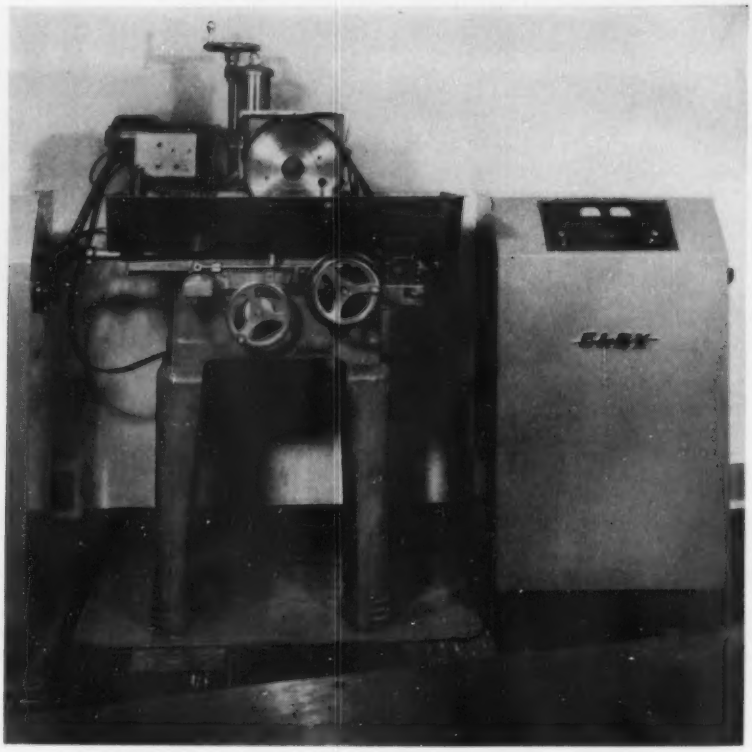
TREPANNING can be employed where a relatively large amount of metal is to be removed. Procedure is similar to other electrical-discharge machining operations, except that the electrode is a piece of brass tubing or shaped sheet metal. This method reduces the area exposed to cutting and removes a solid core of the material. Holes shown are 4 in. in length and were cut with 1/32-in. wall electrode

show range of applications





TRIM DIES for die castings are often complicated. The die shown here would normally be made in segments—perhaps as many as 20 separate parts would be required. The single electrode was formed from brass on profiling equipment. The die block was hardened and ground to size. The word "Lincoln" is 5¾ in. long and the trim die is 5/16 in. thick. The die was cut in a single pass and required 48 min for the coarse and 7 min for the fine cut. This total time of 55 min resulted in electrode wear of ¼ in. in removing 0.131 cu in. of metal. Total cost for labor and material was $37—about one-tenth the cost by ordinary segmental methods



GRINDING MACHINE CAN BE CONVERTED to electrical-discharge machining by substituting brass wheel for conventional grinding wheel and adding switch box and motor. Normal motor must be changed to a geared motor turning wheel at about 100 rpm. Speed is not critical and can vary from 40 to several hundred rpm, but must be less than conventional grinding speeds

Electrical-discharge grinding

With a brass wheel it is possible to grind to tolerances as close and finishes as fine as those possible with a diamond wheel. Metal can be removed faster by electrical-discharge grinding than by diamond grinding.

Wheels are preferably made of free-machining brass and can be turned or formed in a lathe. Because the wheel operates at about 100 rpm there is no danger of chatter, and because erosion always occurs across the shortest gap, the wheel is self-truing.

The wheel does not touch the work, eliminating danger of jamming and allowing plunge cuts directly into the work. Automatic power feed maintains a constant gap between the electrode wheel and the work. This lack of mechanical pressure on the work makes it possible to grind within a few thousandths of an edge without disturbing the thin web remaining.

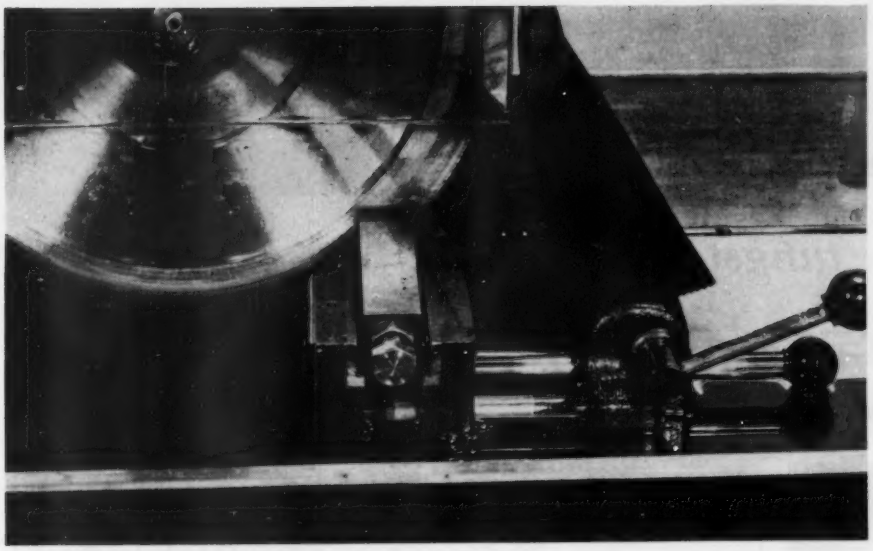
Removal of metal in microscopic particles prevents the development of featheredges when cutting tools are ground. As no heat develops in the work, there is no danger of heat-checking. When grinding carbide-tipped tools, steel and carbide are removed in the same operations, first roughing, then finishing.

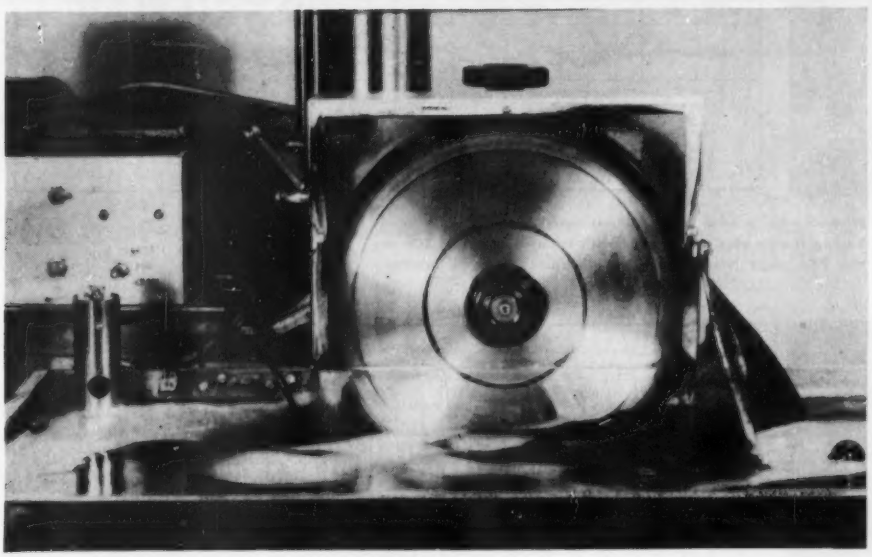
Any conventional grinder can be converted to electrical-discharge grinding by substituting the brass wheel for the conventional diamond or abrasive wheel and adding the necessary switch box and motor. The normal motor must be replaced with a gear reduction motor to produce a wheel speed of about 100 rpm. This speed is not particularly critical and variations from about 40 to several hundred rpm do not appear to have any effect on the results produced.

It is necessary to provide insulation between the wheel and the work supports in converting a grinder.

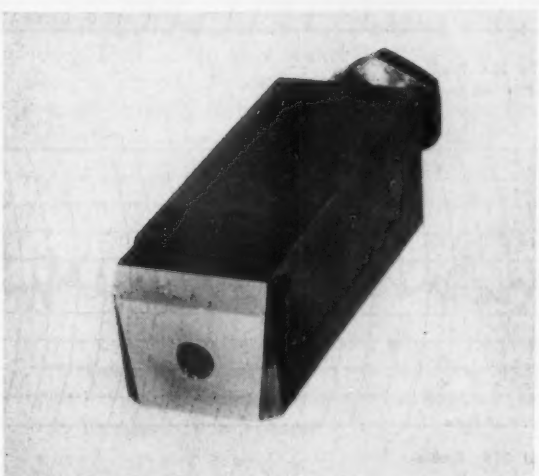
In sharpening a single-point tool, the setup illustrated has a simple vise to hold the tool. In practice, rotating angular fixtures would be used to grind all surfaces on the tool and fixture would be made so that it could be shifted out of the oil for loading and unloading without draining the tank.

Ground surfaces produced with course, medium, and fine settings, along with profilometer charts are included on page 148. Finish characteristics are exactly the same on either external or internal drilled surfaces as they are on ground surfaces.



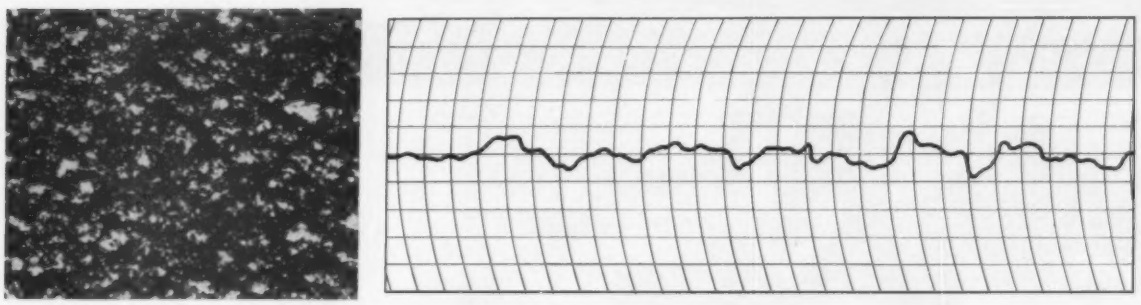


ELECTRICAL - DISCHARGE GRINDER set up for tool grinding (top), and in operation with work immersed in dielectric fluid (below). Switch on panel changes operation to coarse, medium, or fine, as required

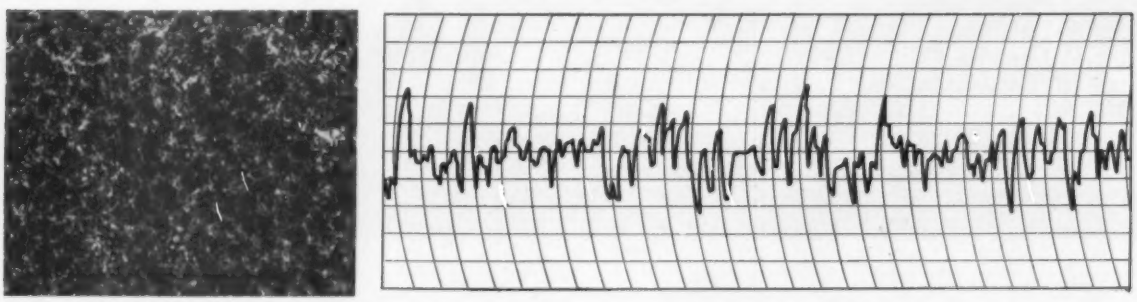


SINGLE-POINT CARBIDE TOOL sharpened by grinding process in two passes, roughing and finishing. Steel shank and carbide tip are cut at the same time. On this tool, stock removal was 0.060 in. and finish is about 15 mu in. rms

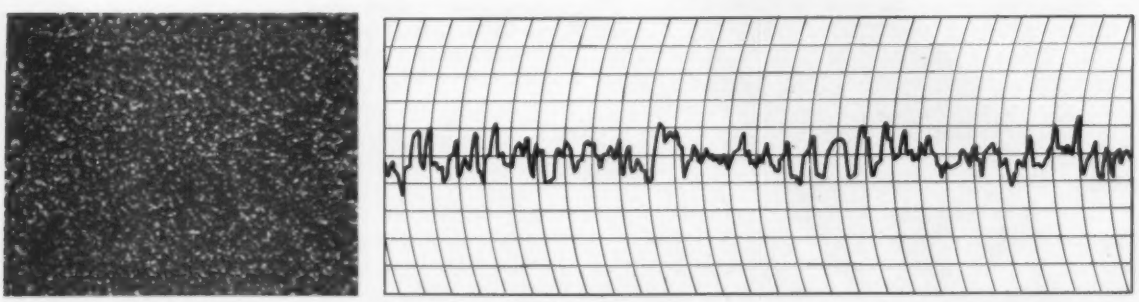
Surface finishes produced on tungsten carbide by electrical-discharge grinding



COARSE SETTING on electrical-discharge grinder produced this surface on Carboloy 55-B, shown at 25X. Profilometer reading shown on chart at right with scale of 1 mm = 100 mu in. rms. All tests shown on this page were made by Detroit Testing Laboratory

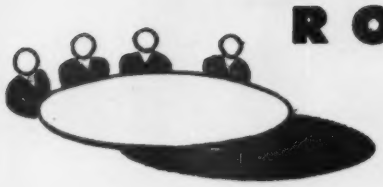


MEDIUM SETTING produced this surface on Carboloy 55-B, shown at 25X. Profilometer chart is at scale of 1 mm = 10 mu in. and gives a reading of 30 mu in. rms



FINE SETTING produced this surface on Carboloy 55-B, shown at 25X. Profilometer chart at scale of 1 mm = 10 mu in. gives a reading of 19 mu in. rms

ROUND TABLE



Parkin' Privileges

"I think you're just afraid you'll get ribbed about it in your department, Al. There's nothing wrong with having a reserved parking spot in the company lot."

"Maybe not, Ed, but how come we got the offer at all? Used to be only the real brass around here got the reserved treatment. Now they want to include foremen."

"Well, there's a good reason. You notice how early the lot fills up these days? There's just too little space and too many cars out there. All the company wants is to make sure its foremen get parking spaces. That doesn't give you any excuse for not being in on time."

"I think it's for the birds, Ed."

"What's your real reason for objecting, Al?"

"Well, I just got tired of seeing Perkins prancing around in his white shop coat yesterday, I guess. He was throwing orders left and right, and he looked like a sideshow ringmaster. I could see some of the men making jokes about him."

"You've just caught a case of self-consciousness, Al. Just because Perkins takes his job too seriously is no reason for you to backtrack in the other direction. I'll admit he's a pompous ass, but that doesn't mean you can't take advantage of company policy when it will do you some good."

"I suppose you're right; but I hate to get too far out on a limb, Ed."

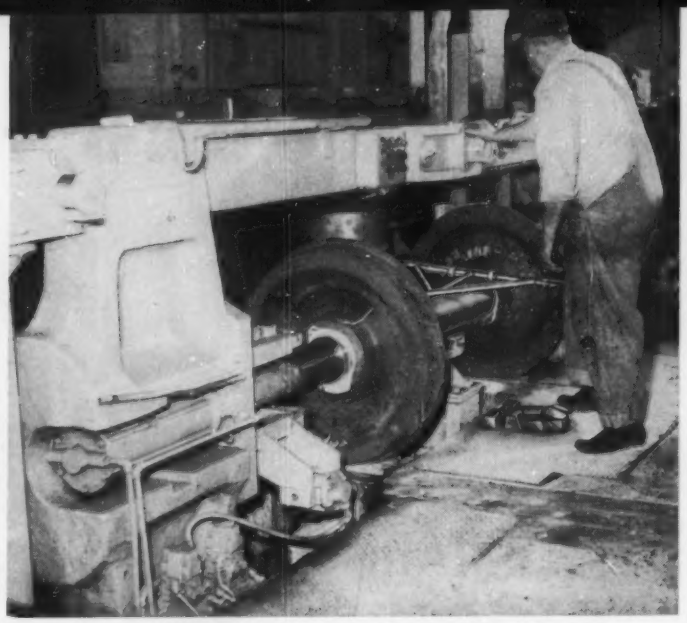
"You're on no limb, Al. Listen, it wasn't too many years ago when the foreman was as important a character as the plant manager—almost. And they put on plenty of airs, too, believe me."

"But everything's more democratic now, Ed. I could never get away with some of the things I've heard of old-time foremen doing."

"You probably couldn't, Al, but you can—and should—take advantage of the benefits offered you. It's for your good, and the company's, too."

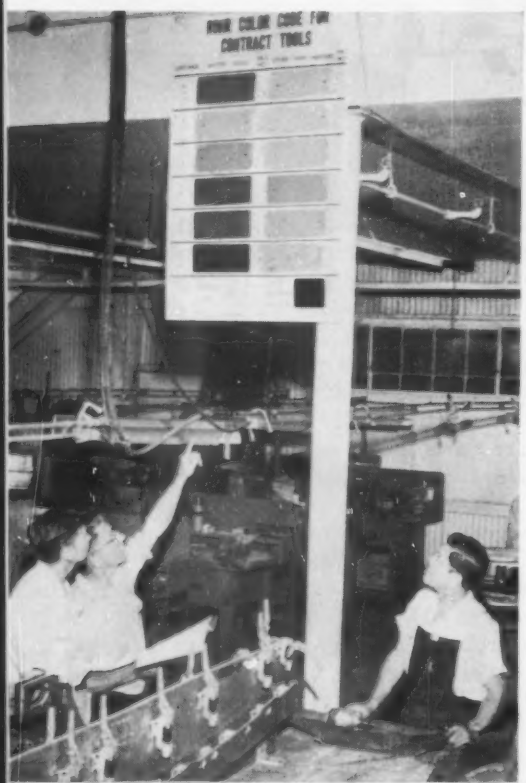
"That means I'll have to trade in my old car and get a bigger one; just to keep up with the other foremen."

HOW UPPITY CAN a foreman afford to get nowadays; or just how democratic can he be without losing the respect of his men? Is Al too timid in shrinking from any show, or is Ed remembering the old days of glory too vividly? Your ideas on the subject may interest others. Discussions of earlier topics appear on later pages.

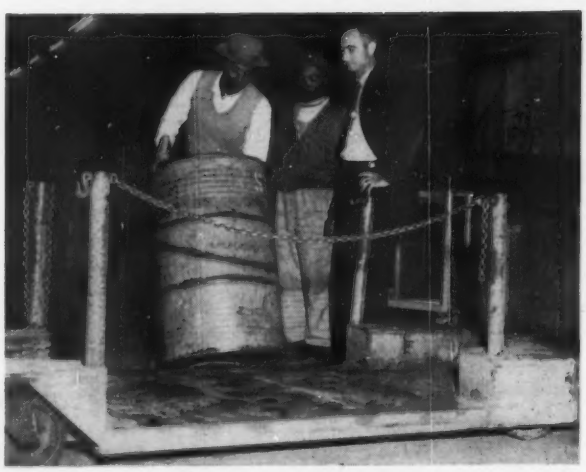


WHEELS ARE PRESSED ON RAILROAD AXLES in the usual way, but only one man instead of two does the job. Treadle controls pressure of air cylinder that pushes wheel into position, so operator can watch gage (below left hand in photo). Mounting force must be between 80 and 135 tons, but the closer to 100 the better. If the job takes over 135, wheel is stripped off at same machine and reworked. *American Car & Foundry Co, Huntington, W Va*

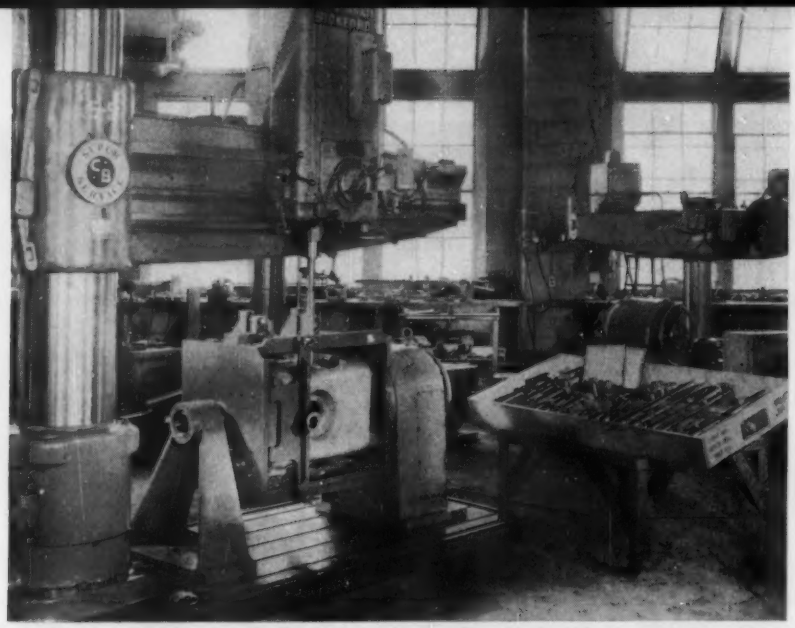
SHOP SHOTS



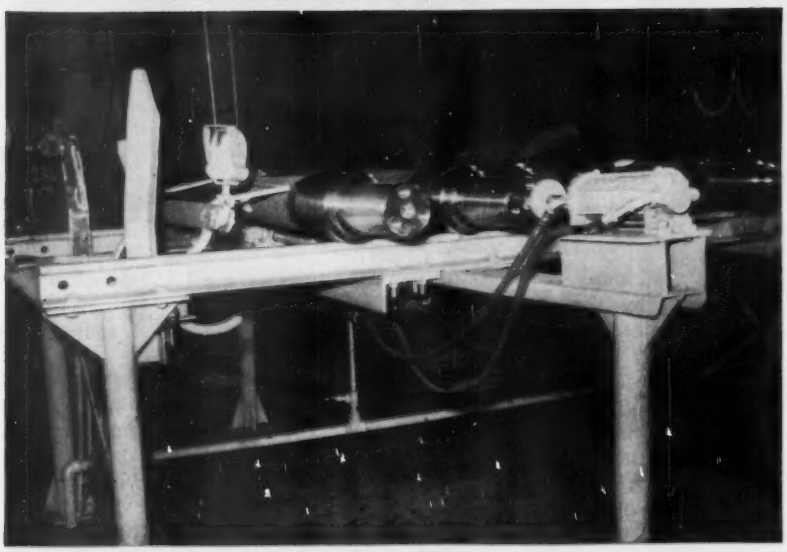
THREE-BY-FIVE-FT COLOR CARDS located in the shop familiarize personnel with new Rohr Aircraft Co color code that identifies tooling for the contract with which it goes. Tooling for Convair parts, for example, is painted gray. Rohr-designed parts are produced with yellow-painted tooling. System simplifies identification, storage, pickup of tooling. *Rohr Aircraft Co, Chula Vista, Calif*



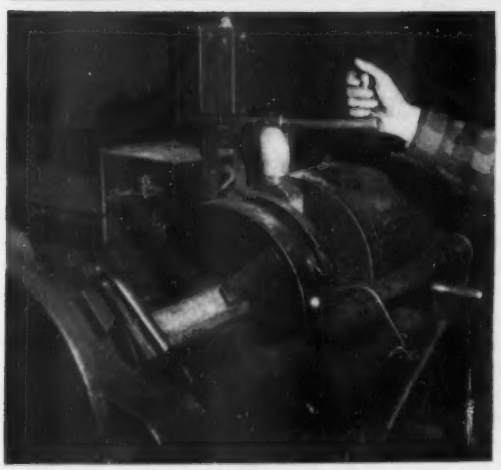
DOLLY FLOOR IS ONLY 6 IN. ABOVE FLOOR, permitting one man with hand cart to load metal-filled barrels used for scrap collection. Idea saves several thousand dollars annually. *Chance Vought Aircraft, Dallas, Texas*

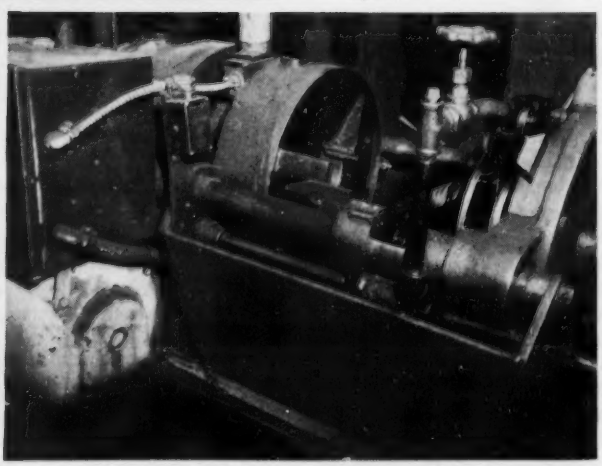


INDEXING TRUNNION FIXTURES at radial drills handle a number of castings for Gorton machines. Tooling is kept in a wooden box fitted with cutouts for each item. Box is issued from tool crib with the shop order. *George Gorton Machine Co, Union City, Wis*



RAILROAD AXES ROLL DOWN RAILS after finish-turning to pickup station operated semi-automatically and remotely from grinder (background, left). Tramrail hoist drops hook to proper height, dogs are tripped to let first axle roll free and into hook, next axle is caught by air cylinders that exert only axial pressure, and hoist picks up axle and moves it to grinder automatically. Grinder operator stays at his machine, pressing button to initiate complete handling cycle. *American Car & Foundry Co, Huntington, W Va*

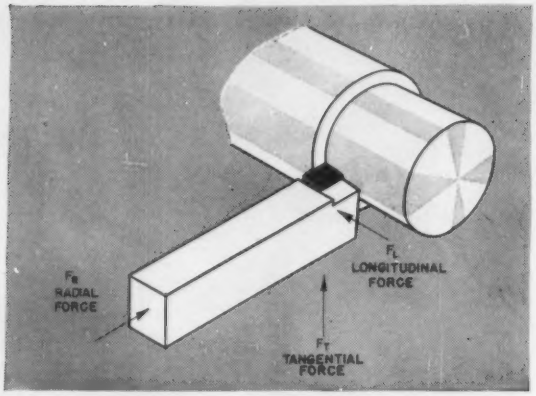




LIMIT SWITCHES ON PIPE-THREADING MACHINE prevent accidents. One is in pipe collar on head just behind chuck, and is in series with motor circuit. Chuck wrench must be placed in V-slot of collar so it depresses switch to close motor circuit. Second switch in motor circuit is mounted next to head in path of bar mounted on slide. Dies cannot run into chuck. *Emerson-Comstock Co, Inc, Chicago*

How to estimate single-point cutting forces

W L KENNICOTT, chief engineer,
KENNAMETAL, INC, LATROBE, PENNA



CUTTING FORCES in single-point turning

Today's increased use of tracer and follower tooling, hydraulic feeds, special-purpose machine tools, and special tool blocks involving tool overhang has interested many engineers in just what forces are involved in single-point tool operation. My purpose here is to set forth in simple terms a method of estimating what forces might be expected in the usual application of single-point carbide tools.

Three distinct forces are involved, and reference to the drawing indicates the direction and designation. One can be simply and accurately calculated; the other two can be quickly estimated, when considered as a percentage or ratio of the first.

F_T is the tangential force represented by the tool support. It forces the tool in such a direction as to shear off and deform the chip. Power is force × distance moved per unit of time. As this is the only one of the three forces which goes any real distance through the work, assume that all cutting power is used up in that direction. One horsepower is 33,000 ft-lb/min. We then assume that $F_T = \frac{hp \times 33{,}000}{V}$, where hp is the power used in cutting, V the speed in fpm, and F_T is pounds force in the tangential direction.

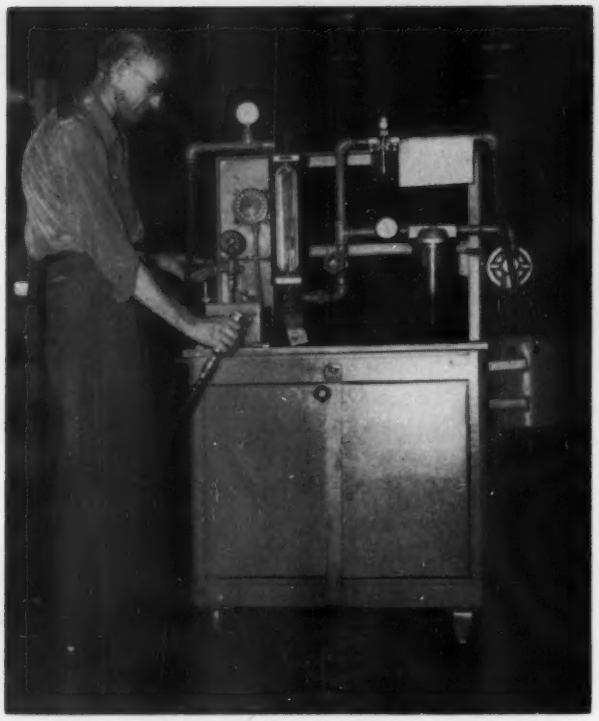
F_L is the longitudinal or feed force, and often that which most concerns us. Unfortunately, it cannot be estimated simply, and is subject to more variables. With extreme side rakes, it could vary from twice F_T (negative side rake) to a negative or self-feeding force (positive ride rake). However, within the usual side rake range of +7° to −7°, F_L will vary from 35 to 70% of F_T. This ratio, F_L/F_T: (1) is virtually independent of nose radius, side cutting-edge angle, back rake or material (except entering a work-hardened surface); (2) increases with negative side rake, decreases with positive side rake; (3) increases at low surface speeds or light feeds, decreases with high surface speeds or heavy feeds. While F_L is a relatively high force, it does not involve much horsepower, as the distance moved per min is low.

F_R is the radial force, seldom critical in single-point tool application except on tracer or cam-follower operations. On non-tracer operations, it uses no horsepower as it has no movement, and even on tracer jobs the movement in this direction is small per minute. F_R will vary from 10 to 50% of F_T, with conventional tool shapes. This ratio, F_R/F_T: (1) is virtually independent of material, depth of cut, side rake, feed or speed within practical ranges; (2) increases with increase in side cutting-edge angle or nose radius; (3) increases with negative back rake, decreases with positive back rake (may even become a negative figure with extreme positive back rake).

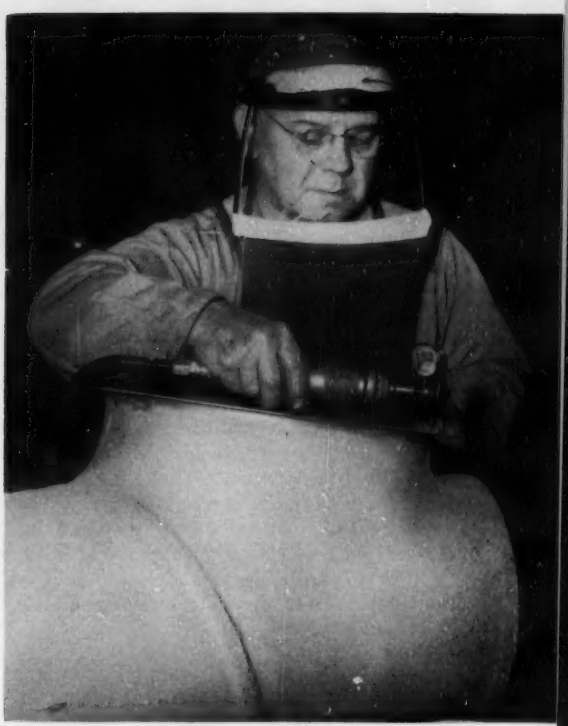
As an example, assume a cut is taking 20 hp at 200 fpm. Thus $F_T = \frac{20 \times 33{,}000}{200} = 3300$ lb. Note that F_T is independent of material being cut, tool dullness, feed, or tool shape, *except as they affect power required*. Considering the extremes of normal tool practice: If the above cut were taken by a 1-in. dia round button with 0° rake and ¼-in. depth of cut, F_L would be about average or 50% of F_T, as it is unaffected by the large nose radius, and rakes, feeds, and speeds are about average. Thus $F_L = 50\%$ of 3300 = 1650 lb. F_R would be high, or 40% of F_T because of large nose radius, or $F_R = 40\%$ of 3300 = 1320 lb.

However, if a style TAR tool was utilized, having a small nose radius, 7° negative rakes, at ½-in. depth of cut, F_L would be a little above average, or 60% of F_T because of negative side rake. Thus $F_L = 60\% \times 3300 = 1980$ lb. F_R would be below average because of 0° side cutting-edge angle, small nose radius, but somewhat affected by the 7° negative back rake, or about 20% of F_T, as shown in the equation: $F_R = 20\% \times 3300 = 660$ lb.

Figures for F_L and F_R are only good estimates, but usually accurate enough for shop purposes. An exact calculation involves so many variables it is impractical for anything short of designing a major machine tool. If hydraulic cylinders are involved, a safety factor of at least two is customary to assure uniform feed, so the approximate value of force required is close enough.



TEST CART, designed and built by Ryan, has fittings and gages to check tool rpm, airflow in cfm, power output, and to allow oiling. Each air tool in shop is checked once a week; defectives are sent to repair shop



TYPICAL AIRTOOL JOB is wire-brushing excess weld metal from stainless-steel exhaust-system part. Air tools in shop total about 4000, plus 95 resistance welders, some large Cecostamp air hammers, and pressure-test stations

Save $20,000 a month with air-tool sense

FIVE benefits Ryan Aeronautical Co, San Diego, Calif, gets from its new air-tool program . . .

1 **Decrease in repair costs for 4000 air-operated hand tools**

2 **Increase in tool efficiency; better and faster work**

3 **Longer life for $300,000 worth of air tools**

4 **Higher availability of tools because of better maintenance**

5 **Higher availability of air power because of more efficient use**

. . . and all in a system anyone with a large number of air tools can apply

If you pay out $2,000,000 in annual wages to workers who use air hand tools, and if your maintenance bill on those tools runs to $82,600 yearly, you might well wonder if you are using those tools efficiently and if you are getting full value out of them. Ryan had this problem, but decided to do something about it. A detailed survey of air-tool efficiency and performance was made, only to prove some surprising facts.

An air tool normally wears slowly, with only the rotor blades subject to much damage if lubrication is properly handled. That is a big "if" however, and according to records in the shop, lubricating was not being done properly. The average repair bill for an air tool was around $50 to $75, which indicated that much more than the rotor blades were being worn before the tools were caught and sent to the repair shop.

The direct result of this finding was a new maintenance system, which uses special test carts and trained operators. These now go through the plant in a regular cycle to test each air tool every week, returning any defective tools to the repair shop immediately, and lubricating the usable tools and

placing them back in service right on the spot.

Each cart carries a flow meter to check the capacity of the tool in fpm, a tachometer to check rpm, and a hydraulic pump and pressure gage to check power development of the tool. If any of these findings are low, the tool is taken to the repair shop for strip-down, inspection, replacement, and cleaning.

Because the cost of reconditioning a tool that has broken down from lack of lubrication is so high, the savings in repair costs with the new system have been quickly recognized. The feature of regular inspection is that it catches trouble before it develops into real damage.

FITTING FAILURES

One of the most revealing results of the survey was the pronounced effect of poor fittings and hoses on tool performance. There are 3000 quick-disconnect fittings in the plant, and each has rubber washers and metal valves that can become worn and will therefore greatly restrict air passage. For example, tests on a number of tools showed that efficiency could be boosted easily by simply replacing worn valves and washers:

PERCENTAGE OF TOOL EFFICIENCY

Line psi	Old Valve & Washer	New Valve & Washer	Efficiency Increase, %
95	48	100	108
98	80	100	25
95	6	90	1400
100	27	88	225
102	5	100	1900
80	25	56	124
85	41	56	36

The pressure drop through a good fitting is only 3 psi, or 5% in tool efficiency, so attention is now paid to fittings to insure they are the best types and are in good condition.

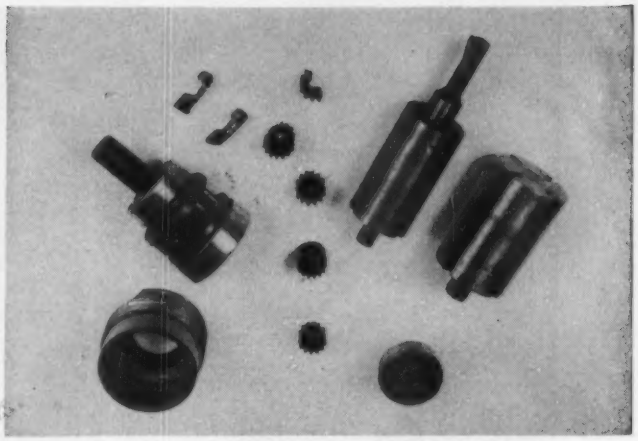
But the most needless loss of all was where lines fed along the plant, necking down to smaller and smaller ID's, until finally they expanded suddenly into large lines where it was expected the pressure and air flow would be the same as you could get from a large-diameter line all the way from the compressor.

The smallest inside hose diameter recommended by the tool builders is 5/16 in., yet ¼ in. was not uncommon in the plant. Tests have proven that the loss may be as much as 1 psi per ft of length in the hose when ID's are slightly undersize. And in some cases as much as 25 ft of hose was installed to hook up a tool only 6 ft from the air outlet. Simply uncoiling the hose would raise pressure 2 psi, and shortening it would increase the gain.

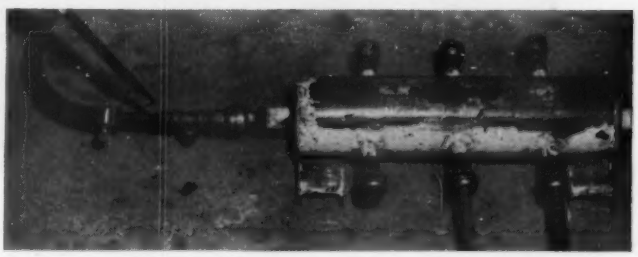
But small hoses along the line were the worst offenders . . . as in one case where a ¼-in. hose was dropped from a tool hookup, resulting in 42% gain in tool efficiency.

Here are examples of gains made in the plant by substituting ⅜-in. air hose for all ¼-in. hose:

Line psi	Tool Efficiency ¼-in. hose	Length	New Efficiency ⅜-in.	Length	Increase in Efficiency, %
106	76%	12 ft	100	12 ft	31.5%
94	33	20	92	12	178.7
94	49	14	92	12	87.7
98	46	14	90	12	95.6
100	36	15	100	12	177.7



DAMAGED PNEUMATIC TOOL shows what can happen without proper lubrication. Rotor splines were badly twisted by the time the gear broke. Other parts are also worn excessively

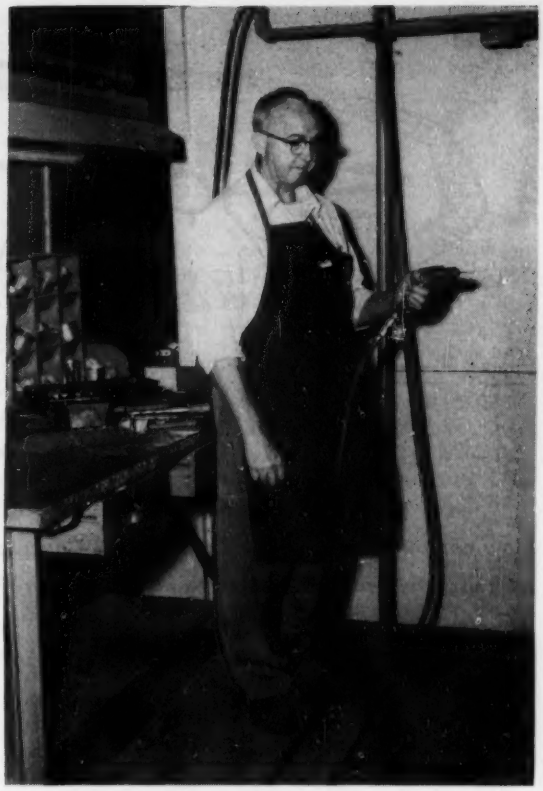


RESTRICTED AIR FLOW crops up often to reduce value of air tools. Here a short section of ¼-in. airline cuts down on power delivered to six tools fed from this "pig." Drain cock to right of blade has been plugged, which is also bad practice

As a result of the study, Hansen fittings and ⅜-in. lines as short as possible to the work stations are now standard. Fittings are regularly inspected. Valves with square corners replace tapered valves to provide 14% more air. No more than 10 Hansen fittings are hooked to a ½-in. pipe inlet, and "pigs" (short lengths of 3-in. pipe with six fittings and a drain) are served by hose of the proper size.

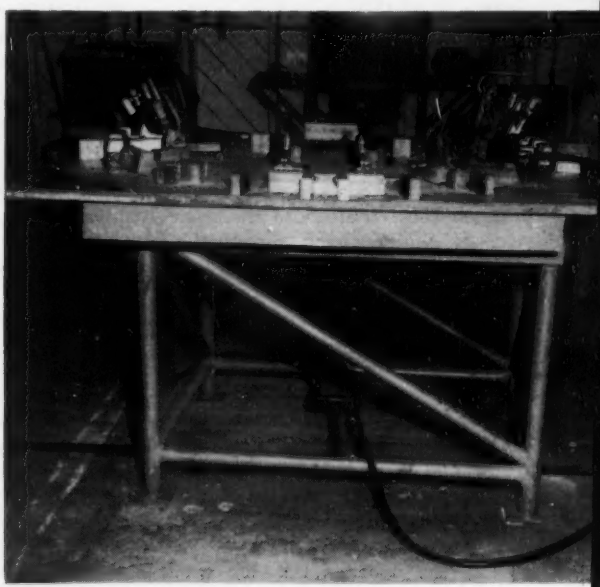
Altogether, these steps have increased tool power as much as 200% and have made the supply of compressed air in the plant, with the same generating system, more dependable and more immediately available. It actually takes more air to keep the larger lines full, but the consumption of air at the tools is less because of much better efficiency.

EXCESS AIRHOSE coiled at work station is a power bleeder because of both length and coiling. Hose here is a water trap because it comes off bottom of line



GOOD PNEUMATIC-POWER TAKEOFF is from top of line, with hose just long enough, and not coiled. Difference in tool power, with same tool as shown in other photo, is appreciable

TOO MUCH AIR HOSE at bench work station cuts power and provides danger to personnel. Friction losses in line are simply multiplied by coiling



BETTER SETUP USES STRAIGHT HOSE, cleaner line fittings, and no coils. Best setup would be air supplied direct to fixture, if possible

How can pilferage losses be kept down? Can you discourage shop thefts, or must they be halted by drastic—and often harsh—action? Has this ever happened in your shop?

BERT A HALL

Midnight whistles ended the late shift at Maxwell Manufacturing Corp, and soon homegoing workers were clicking their lunch boxes open and shut as they passed the guards at the main gate.

Ed Lockerby walked quickly across the street and climbed into his car. He started up, drove north half a block, then made a U-turn and stopped just under one of the dimly-lit plant windows. He got out and stood under the window for a movement. Above him, the window tipped open and a bundle dropped into his waiting hands. Then he walked to the car, dropped the bundle onto the rear seat, and walked back to open the trunk.

Almost immediately another man appeared—and paused at the corner of the building. He reached into the space between the building wall and the fence and pulled out a large piece of sheet metal. Then he carried it to the open trunk and laid it down flat. Ed locked the trunk, and both men climbed into the car. Just as Ed was fumbling with the ignition switch, the door on his side was rudely jerked open.

"All right, Buster; what's in that bundle you got? Hand it over!" It was "Big Ben" Mulford, sergeant of the plant police. Ed looked startled for a second, then resigned. He reached back and handed the bundle to Mulford.

"O K . . . . . now what's your name and clock number?"

"Lockerby; 227," replied Ed.

"Department?"

"62." Mulford wrote it down in his book, then moved toward the rear of the car.

"Let's have a look at that steel you put away in the rear."

Ed got out, unlocked the trunk, and handed the sheet to Mulford. The guard took it to the plant-protection truck parked down the block, and came back to ask the same questions of Claude Hicks. When he left them, the two men just sat and looked at each other.

THE AXE

Both of them knew they were in for a rough time. The company's current harsh policy toward pilferers was well known, and the fact that what they'd taken wasn't worth more than a dollar wouldn't help their case a bit. Ed had taken the bundle of used burlap from a sweeper's rubbish cart. Along with other junk, floor sweepings, and the like, the burlap would soon have been on its way to a bonfire at the city dump; but Ed had figured it would make a good mat for the sidewalk in his back yard. The piece of steel which Claude Hicks had taken had also come from a box of scrap. He had cut it to the size he needed to repair his furnace. Neither man considered he had committed any real crime in converting a little "scrap" to his own use—but had been forced to the "cloak and dagger" routine by newly stiffened plant regulations against pilferage, agreed to by the union.

First they'd have to appear before a joint union-management committee hearing, where they'd probably get their choice of quitting or being fired and prosecuted for theft. Then they'd have to hunt up new jobs. This wouldn't be easy. Both men were past middle age, and the results of the hearing would be added to their employment records, which wouldn't help a bit.

The company would take a beating, too. Lockerby and Hicks were skilled mechanics with long and worthy service records behind them —in each case over 15 years. It would take months for the company to train men to replace them,

and even then the company wouldn't have equivalent workers. In addition, the reaction to their leaving in the shop would probably be irritation and discontent; and perhaps also reduced output for a time.

If the actual loss from pilferage was minor, the company would be better off to keep the men after suitable punishment. But pilferage losses were high; Maxwell had recorded losses of $30,000 in the preceding year, including $3000 in small electric clocks that were simple to slip past the gate guards. It was even rumored that a supervisor had cooperated in getting a major appliance out in a vendor's truck a couple of years back. Therefore, the company would be reluctant to ease up on the two men once they had been foolish enough to get involved in theft.

CUTTING THE LOSS

Acting tough would probably discourage a number of men from taking chances on lifting items from the company, but there are always a few who will dare anything. In many cases, a policy of reducing pilferage by removing the temptation is wiser. A plant can do this by selling off scrap materials, parts, and equipment at reasonable prices. One plant does this on a regular basis, with scrap picked and priced by the salvage department. Shop employees are allowed to buy anything they want, as long as it is on the salvage list. Unfortunately, even this practice can end up badly as far as the company is concerned.

One worker wanted a pump for his cellar. He spotted one in a junk heap and examined it. He decided he could repair and use it, so he asked his supervisor about procedure. He was told to tag the pump and take it to the salvage department. Company policy dictated that the pump be held until the regular sale, then offered freely to whoever wanted it. By the time the worker who'd spotted it got to the sale, it had been bought by another man. The result was that the worker distrusted the company.

Many other schemes have been used. One company has a junk bin just inside the main gate, past the guard stations where inspections of personnel are made. The salvage department puts out materials and parts almost every day, and workers just help themselves, free, on their way home. But the scrap is limited, and there have been fights over who got which choice bit of stock.

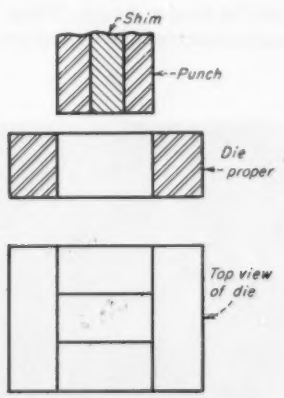
TELL THE TRUTH

As in the case of many other problems, education is a good partial answer. If pilferage is not treated as taboo, and workers are freely told that certain things are being stolen and that the company is not going to stand for it, the result may well be a better attitude within the shop. If company management can take the time and make the effort to show just and sufficient reasons why pilferage really hurts the company, and thereby the employees, the company is more likely to receive fair treatment from the workers.

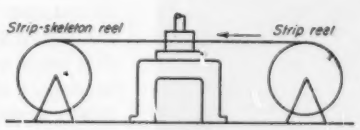
Although theft is theft, and there are no two ways about stealing, the average worker can't see why his taking just a small piece of stock can do any harm to the company. It is up to the company to show and convince him, without making him angry, that pilferage is a bad deal for all concerned.

Diemakers' Kinks

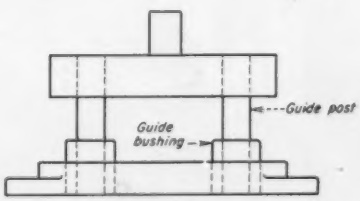
FEDERICO STRASSER



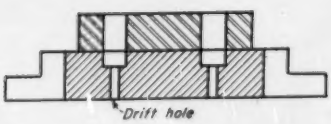
SHIMS in slitting punches take up wear and permit keeping the proper tolerances on the cut dimensions. Make the punch section in sections. When the punch is worn, insert a new shim to maintain the desired clearance in the die.



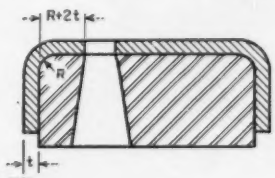
TO PREVENT WAVINESS or corrugations in workpieces, especially with light strip, it is good practice to re-reel the strip skeleton. Thus, tension can be kept on the strip.



DIE SETS with inverted aligning members (guide bushings in die shoe and posts in punch holder) produce better punch guiding, when little or no clearance can be used. This condition is required when punching or blanking very thin and hard stock.

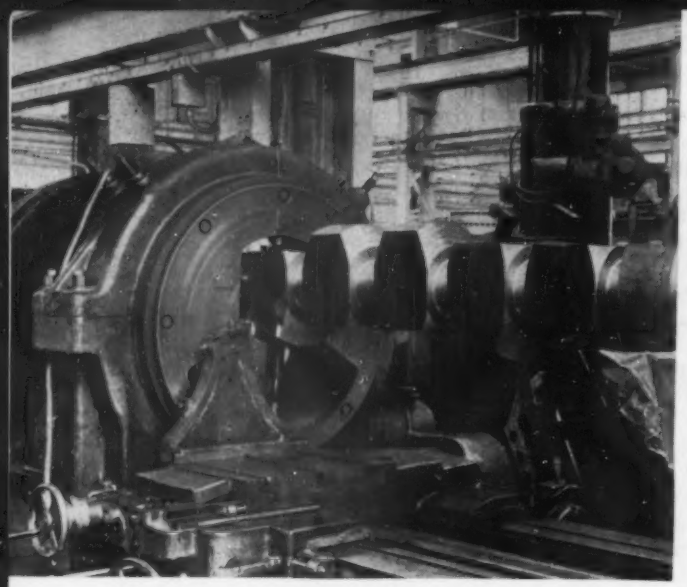


DRIFT HOLES in die shoes are normally made smaller than dowel-pin holes to avoid weakening the shoe. The small hole permits the dowel pins to be driven out for removal of the die plate.



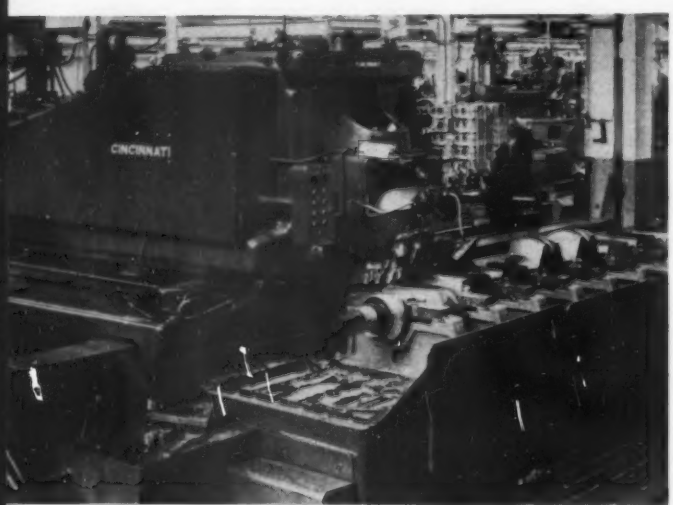
PIERCED HOLES in the bottom of a shell should be located not closer to the side wall than twice the stock thickness plus the bottom radius. This rule should be observed to prevent tearing of the metal and excessive die wear.

HOW BRITAIN MACHINES BIG DIESEL CRANKSHAFTS



FIRST OPERATION ON ROUGH CRANKSHAFTS is turning. Oldfield & Schofield center-drive lathe with two tailstocks roughs intermediate journals with 4-in.-wide form tools. One is on each side of powered steadyrest, driving straight in at 0.02 ipr until tool is cutting full width, then at 0.01 ipr. All diameters concentric with shaft centerline are roughed, leaving ¼ in. for finishing

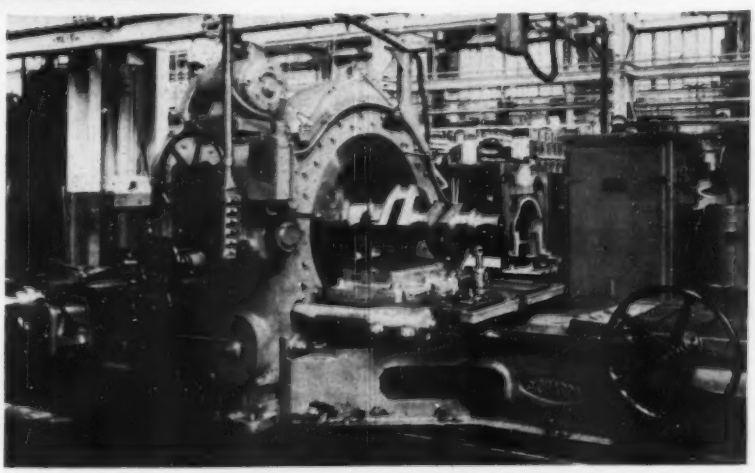
Mirrlees, Bickerton, & Day, Ltd, Stockport, England, is the first firm to produce diesel engines of capacities up to 3000 bhp by flow-line techniques. As an example of how heavy machining equipment is set up for the work, here is a quick rundown on the crankshaft line



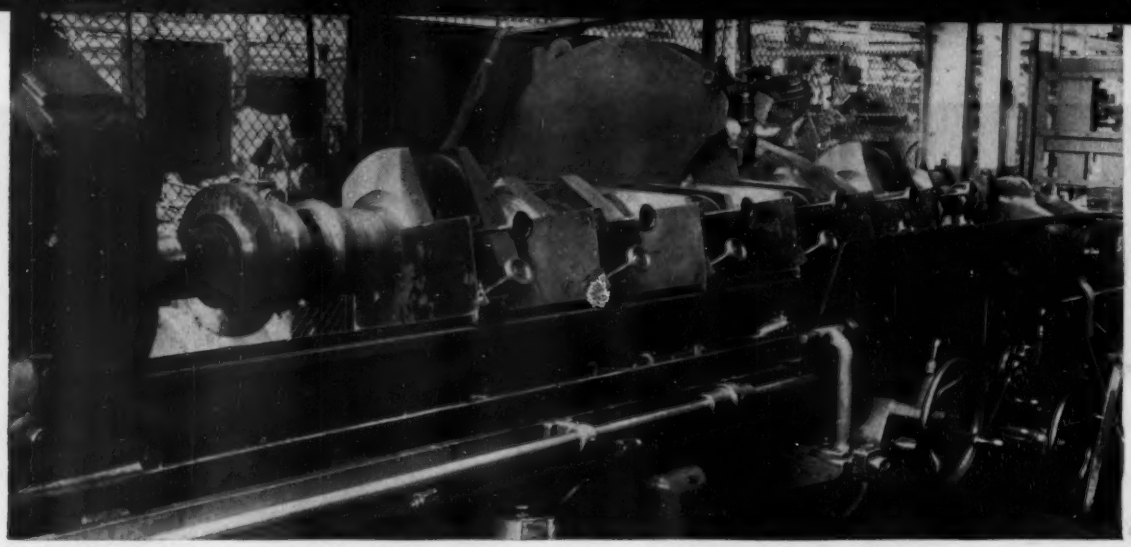
CRANKWEB SIDES ARE MACHINED FLAT by heavy-duty Cincinnati miller or on double-head planer. This is after crankpins have also been roughed and most diameters finished

Raw material for the huge crankshafts is heat-treated and tested forgings, produced either by hammer or drop techniques. Both kinds of forgings are machined in the same manner, and there is little difference in total machining time to finished dimensions between the two styles.

The photos on these two pages show sample operations through the complete process. One important factor in heavy machining—vibration—is taken care of by extra-rigid mounting in the machines. During rough machining, for example, heavy screws in a jawplate carried by the powered steadyrest hold the shafts secure. When the crankpins are rough-machined, both ends of a



CRANKPINS ARE FINISHED in special Richards turning machine that holds shaft in throw-blocks contained in powered steadyrest. New tool cuts final 0.010 to 0.015 in. to insure smooth matte finish. Side faces of webs are cut to size by traversing crankshaft against facing tool

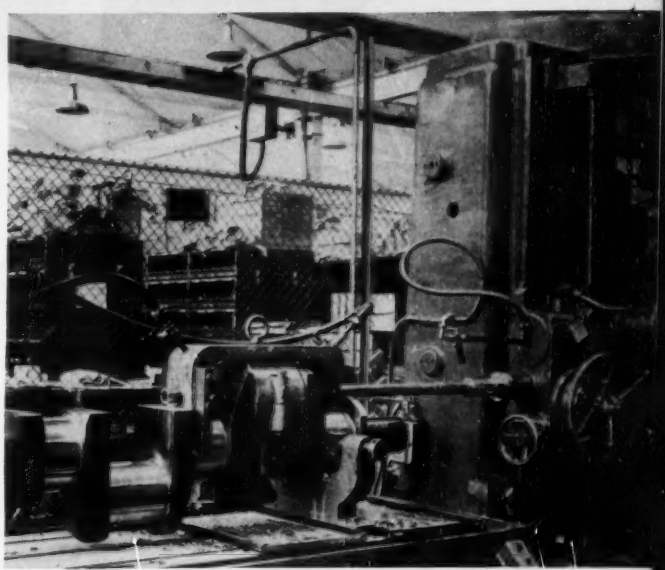


ALL JOURNALS ARE GROUND to finish diameter to accuracy of 0.0005 in., which requires skilled operator, unlike Richards operation where machine determines accuracy

shaft are held rigidly in throwblocks attached to faceplates on tailstocks. To prevent motion that might introduce torsion within the shaft, both tailstocks are geared to the powered steadyrest that rotates the shaft, so all gripping mechanisms rotate exactly in synchronism.

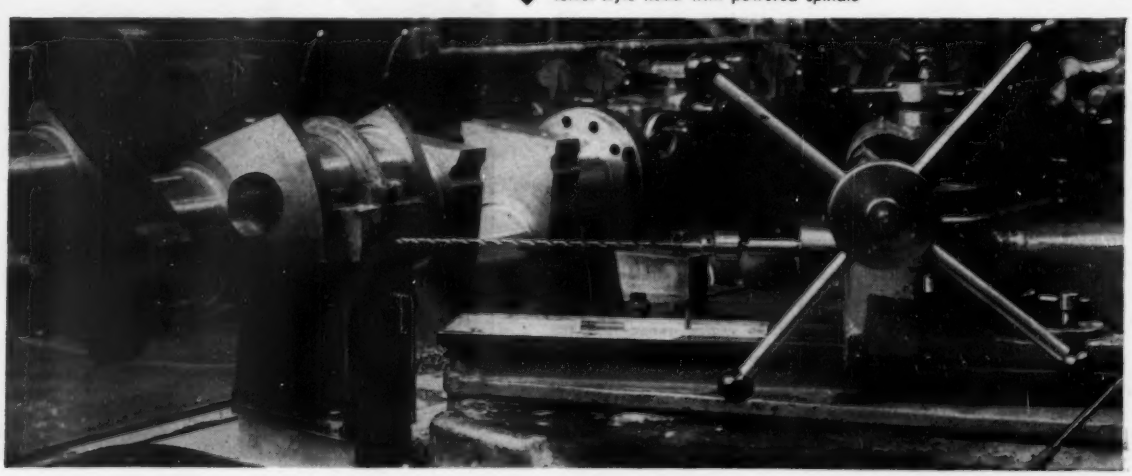
Form tools are used where possible, and each tool is as wide as possible to keep the actual number of cutting passes low. Inspections are made after each operation to catch errors immediately.

One production and economic improvement for the near future is the substitution of crankshafts made by the continuous-grain process.



CRANKPIN IS BORED on mill with fixture that supports shaft steady and jig that fits over crank to position boring bar

OIL HOLES ARE DRILLED by setting up shaft on jig fixture, then advancing turret-style head with powered spindle



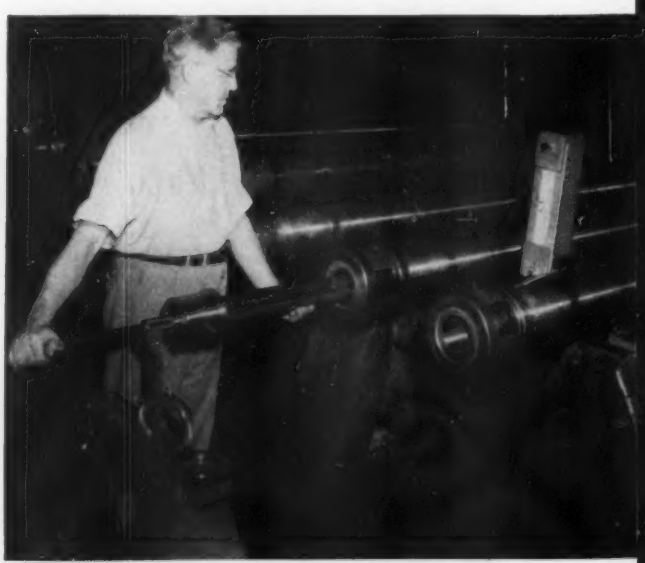
STAR GAGE. For 50 years, the basic instrument for progressively checking the diameter of a deep hole at various depths has been the mechanical star gage. This device is really an inside micrometer with three mechanically telescoped measuring anvils. Device is slow in use, requires a highly skilled operator, and its accuracy capabilities lie between 0.0002 and 0.0005 in. Operator calibrates gaging head with master setting ring gages, inserts tube to first depth, expounds anvils to contact the bore, reads the vernier, then repeats

how Navy probes bores

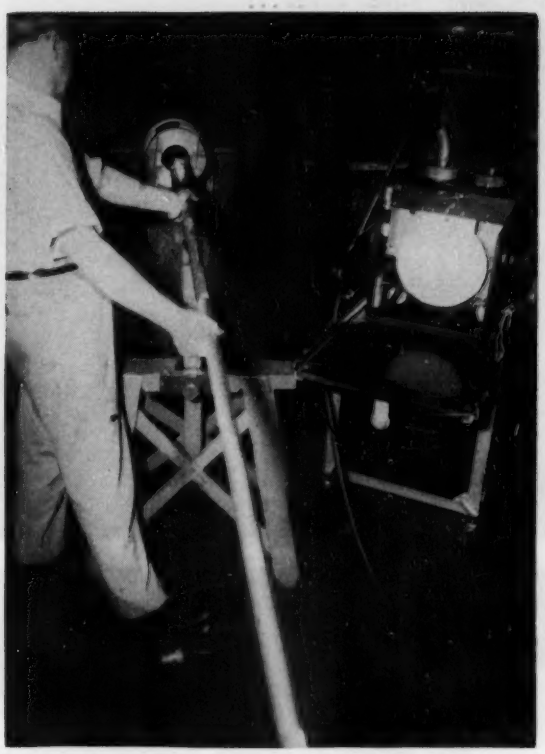
JOHN A PENN, head tool engineer, US NAVAL GUN FACTORY, WASHINGTON 25, D C

Since the time of Eli Whitney, much of the development of gaging methods has been closely associated with gun manufacture. Components of a gun—whether for use on land, sea or in the air—present dimensional gaging problems of greater difficulty and complexity than most parts mass-produced for civilian use. A gun tube has a precision bore of great length and helical rifled features. The chamber of a gun tube consists of a series of progressively tapered features originating at the breech and terminating at the rifling.

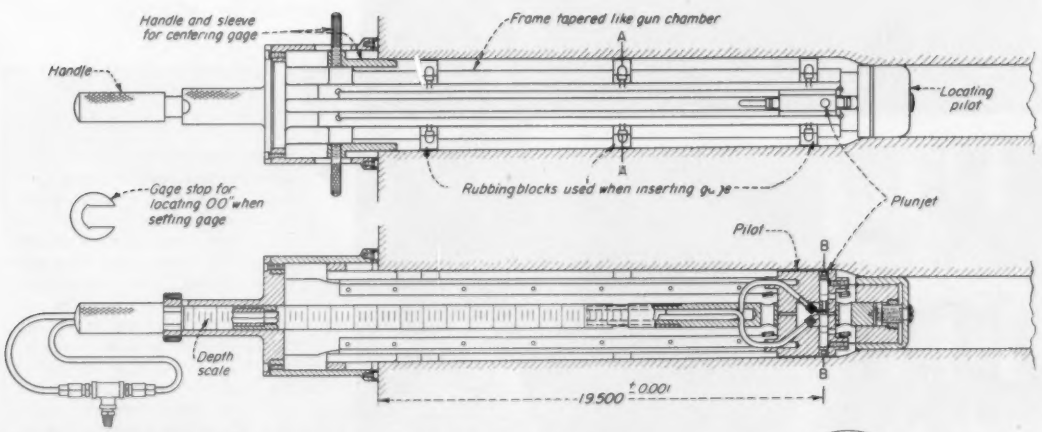
To maintain its century-old tradition of producing the best in firepower, the U. S. Naval Gun Factory at Washington, DC, both develops and applies new gaging devices that assure the highest dimensional precision yet attained in gun production and at the same time a minimum of inspection costs. Every known method of gaging the bores and chambers of gun tubes is in use. In addition, Naval personnel are busily developing new devices and improved methods. Inspection devices range from the time-tried but slow star gage, through three types of air gages—blade jet, ball, and open jet—to experimental electrical devices. At least one of these methods is a basically new approach to measurement of internal tapers and may well have applications for civilian work.



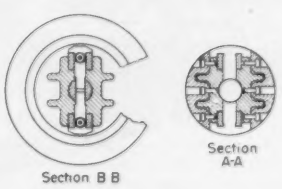
AIR GAGE FOR BORES. Faster and more accurate checking of a plain bore is obtained by use of an air gage. The gaging spindle can be passed rapidly through the gun and any off-tolerance conditions noted immediately on the scale of the instrument. Readings to an accuracy of better than 0.0001 in. are possible. Relatively unskilled operators can inspect a complete gun in a fraction of the time required for mechanical star gaging. Diameters are indicated on a flow-type air gage column unit



RECORDING BORE GAGE. Before rifling, the ID of barrels is checked with a recording bore gage, which has a chart scale graduated to 0.0002 in. Operator inserts gaging head in the barrel, steps on switch to start flow of air. Device is supplied with two heads: one with two gaging members for checking diameter and out-of-roundness of plain bores; the other with three gaging members for checking diameter of rifling grooves. The gaging points can be reset to suit the spacing of grooves. This gage can be used at the gun lathe



TRACER-TYPE INTERNAL GAGE. Recent development at the Naval Gun Factory for gun chamber measurement is a tracer-type internal gage. Device uses "Plunjets" (mechanical-contact air-gaging units) in sleds positioned radially to correspond with the nominal tapers. Device is set with rings calibrated to specified datum diameters. Continuous measurements are made of diameter and out-of-roundness at any point in the body section of the gun chamber. Readings of the air gage (opposite page) are recorded. Plunjets are precision, variable-escape air orifices. When matched and calibrated in diametrically opposite mountings, they offer a basically new approach to internal taper measurement, not only for gun-chambers but commercial applications too

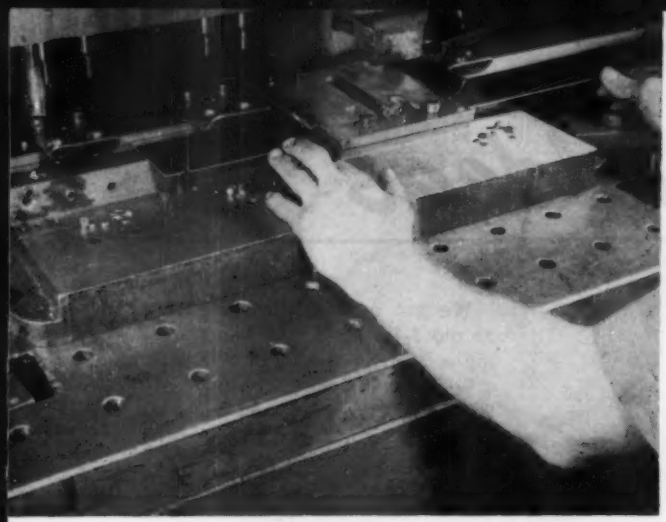


PLEASE TURN PAGE . . .

DIAL INDICATOR GAGE. After proof firing, bore diameter is checked with a dial-indicator gage that operates much like a star gage. Jet-blade air gages recently developed for inspection of used guns are shown in the background

EXPERIMENTAL RECORDING GAGE. Navy has been working on a recording gage that will provide a certificate for a gun. Principle of the device is that of a balanced inductance loop. Two contacts actuate inductance coils, and these in turn affect the circuits. Standard tranducers are used. Readings can be taken on a galvanometer or a recording chart. Multiple columns on the latter provide the information desired in respect to groove depth, land dia and groove dia

TURRET-MOUNTED AIR GAGES. Salvaged, flow-type air gages have been mounted in a turret on a floorstand to serve either of two turret lathes that chamber 20-mm barrels. By adding new taper air-gage spindles, Navy checks four features of gun chamber to an accuracy of better than 0.0001 in. Diameter, taper and out-of-roundness are checked in a fraction of the time that would be required with calibrated-diameter taper plug gages and prussian blue. A similar gage turret is used in the final inspection department. Currently available air-gage base units of the multiple-column type permit readings of all dimensions on a single unit, in contrast to Navy's salvaged equipment



SLUG-DISPOSAL PROBLEM is solved in many different piercing dies by inserts mounted flush in die shoe with machined passages to eject slugs from top front of die shoe. Punching bolt and rivet holes in metal shelving, lockers, cabinets, bins, tool boxes, and stands requires wide variety of diesets usable in a variety of punch presses

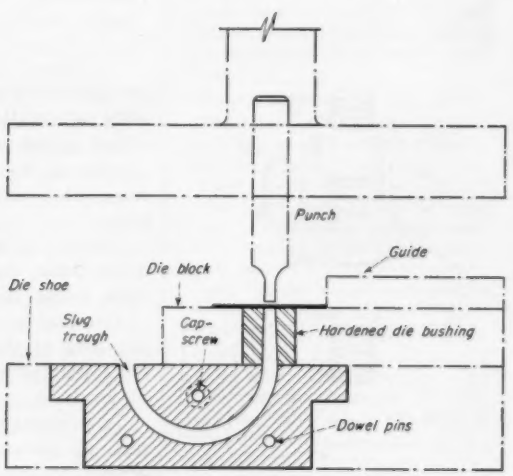
EJECTOR ASSEMBLIES are made with projections to locate on ledges in die shoe, are held in place by recessed capscrews. Ejectors must be accurately located so slug openings will line up with openings in die bushings

HARDENED GUIDES EJECT SLUG PROBLEM

Punching dies mounted on parallels for slug clearance can clog, causing breakage, unless slugs are cleaned out frequently. This can be avoided by holes through the bolster plate, but too many holes weaken the bolster. Inserts with slug troughs in the die shoe provide a disposal method flexible enough to fit a wide variety of punching and blanking operations

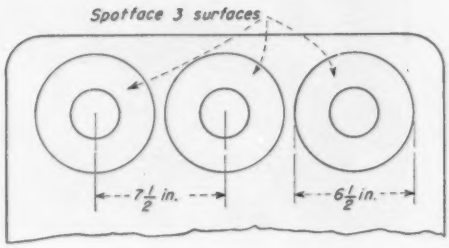
J G SCHLINDWEIN, tool supervisor, LYON METAL PRODUCTS, INC, AURORA, ILL

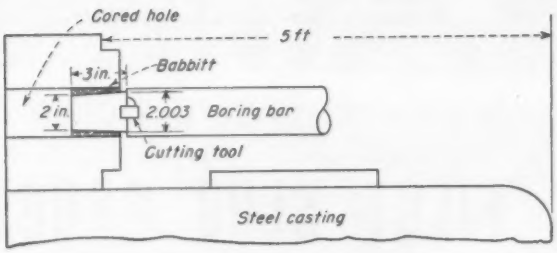
DOWEL PINS AND CAPSCREW ASSEMBLE the halves of ejector, permit easy opening for inspection or cleaning. If necessary to combine two slug troughs in one insert it is made in thin sections, split along centerline of each trough for ease of machining. Trough is slightly larger than slug, but not large enough to permit a jam



180° TURN IS NORMAL in die troughs to bring slugs back to top of die shoe in front of die. Also possible are 90° turns to eject slugs from front of shoe. Passageway can be circular, square, oval, or have other regular shapes. Inserts are hardened and troughs are ground and polished so slugs can slide through easily

Practical Ideas





In-Place Babbitting Aids Spotfacing Large Casting

We had a large steel casting—8 tons—to spotface in six awkward places, almost impossible to get at without doing a lot of extra machining.

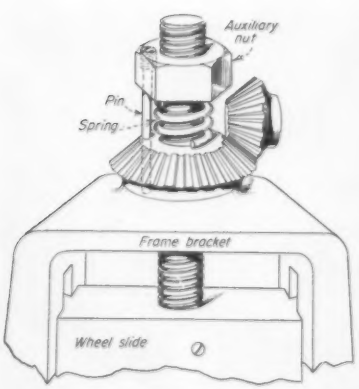
The holes were 5 in. deep, 2½-in. diameter cored, with a 6½-in. spotface required. We could have bored these holes, and back-spotfaced them with a small bar and pilot bushing, but this would have meant extra time and expense.

We got around this by taking an old 3-in. boring bar, and turning a 2-in. pilot on the end, with a ¾-in. toolbit hole. The pilot had 0.001 tpi, and, of the ¾ in. toolbit hole, ¼ in. was in the pilot diameter. A setscrew held the tool in place. The boring bar was relieved above the toolbit for chip clearance.

Then, by placing the casting on a horizontal boring mill, we lined up the bar with other machined work on the casting, and packed mud around each end of the pilot on the boring bar. We then poured babbitt into the space between the bar and the cored hole.

The 0.003 in. taper made it easy to extract the bar after pouring the babbitt. With a little oil on the babbitt and the pilot, we had a very good support for the spotfacing bar.

We roughed the spotface in three cuts with a carbide tool, and finished the cut with a HSS tool. The job not only saved time, but the pilot support eliminated chatter which is usually a problem on this kind of job. *James H Rollin, Clearfield, Penna*



Auxiliary Spring Makes Safer Surface Grinders

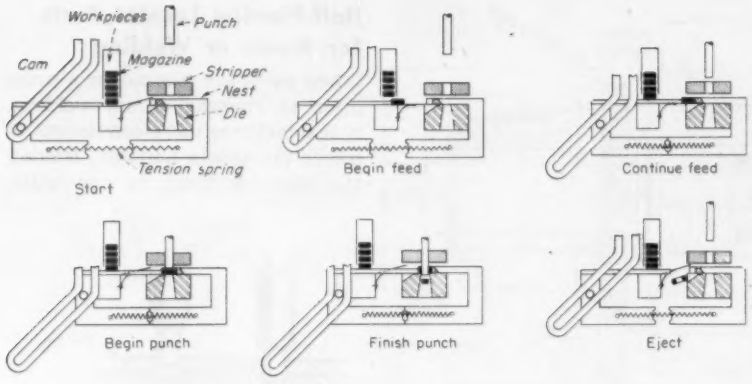
As wear takes place between the nut and screw on the vertical wheel slide of small surface and cylindrical grinders, there is often a danger of the slide dropping, because of a sudden jar of the machine.

Unless the wheel slide gibs are quite loose, so the weight of the slide keeps the thread of the nut in the gear in contact with the upper side of the screw thread, the slide may drop and ruin a piece of work.

To prevent this, a spring tension nut, as shown, is placed on the screw, to keep the slide always at its lowest position on the screw thread. The auxiliary nut is linked to the gear nut through a dowel pin which is threaded into the auxiliary nut, but is a loose sliding fit on the gear nut.

Care should be taken that the slide works freely on its bearing. If there are tight and loose spots in the slide, the upright bearing and slide should be "scraped in."

To adjust the auxiliary nut, tighten the auxiliary nut until there is enough spring pressure, and then insert the dowel pin, so that both nuts rotate together. This keeps play out of the wheel slide, and insures positive dial readings with either upward or downward movement of the wheel slide. This method of preventing backlash can be successfully applied to other, similar situations. *Wm C Betz, New Britain, Conn*



Magazine Feed Speeds Second Die Operations

Loading and unloading of workpieces in second operation dies often take too much time, so it is important to try to shorten the job as much as possible. The die described here is equipped with a semi-automatic feeder and a fully automatic ejector which work in such a way that loading and unloading times are cut to a minimum.

Hourly output with this die has been trebled, compared to similar punching dies, not equipped with the loading devices.

At the starting position, the die is open. The stationary, vertical magazine, whose hole is a loose fit for the blanks to be punched, is filled with components to be punched. At the bottom of the magazine there are slots through which the blanks can easily be pushed out.

When the pressram descends, the cam, which has a long inclined slot in it, pushes a sliding plate toward the die, and the bottom workpiece is pushed out of the magazine and moves toward the nest.

Now the pivoted plate, held until this time in up-position by a very light flat spring, is swung down to horizontal and allows the workpiece to travel further. The blank is thus pushed until it enters the nest. Then the sliding plate pushes the blank and nest together until the blank is in working position. A little more descent of the ram effects piercing.

Then the ram ascends, the sliding plate is pushed in the opposite direction, and the nest moves with the plate. The pierced stamping is pushed out of the die and falls down the bevelled surface of the die. After completion of the upstroke, the tool is ready to go through another cycle.

So the pivoted plate won't interfere with easy ejection of the finished part, there is a clearance opening in the end of the sliding plate in which the pivoted plate is lifted as soon as the blank is in working position.

The die proper is made of hardened tool steel. Its only special feature is a bevel on the inside, to ease unloading of the finished work. The punch and stripper, also made of hardened steel, are of standard design.

The canal between stripper and die-plate is only very little thicker than the nest, and the nest is little thicker than the blank. These conditions avoid the possibility of the blank leaving the nest before, during, and after punching.

Blanks are totally enclosed by the nest during punching, giving high accuracy of punched-hole location. *Federico Strasser, Santiago, Chile*

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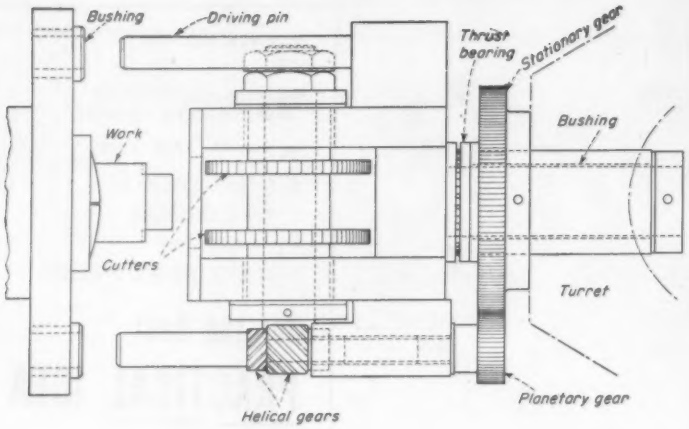


Planetary Fixture Mills Flats In Position In Turret Lathe

We recently received a long-run turret lathe job in which the work, made of bar stock, required extensive turning operations, and called for milling two flats on one end. To complete the job as quickly as possible, we decided to mill the flats in place on the lathe.

To do this we built the fixture shown. The fixture, holding two milling cutters, rotates in unison with the work, and a gear train drives the cutters, which mill the flats as the fixture is fed into the work.

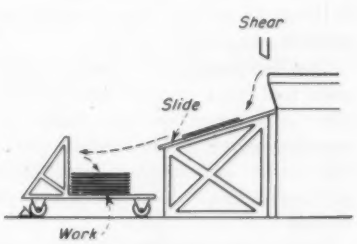
The frame of the fixture is a yoke with a shank on one end, which rides in a bushed steel sleeve in one station of the turret. A collar holds the end of the shank, and thrust is taken by a bearing between the yoke and a large stationary gear fastened to the sleeve in the turret.

The yoke - fixture is driven through driving pins which enter a bushing plate on the spindle.

The milling cutters, positioned by collars, are keyed to an arbor, and held in a bored and bushed hole in the yoke. On one end of the cutter arbor is a helical gear, meshing with another helical gear mounted in a shaft supported by a bearing block on the yoke.

As the fixture rotates, the spur gear rolls around stationary gear, driving the cutters through the helical gears. As the turret is fed forward, the cutters advance into the work and mill the flats. After the milling operation, stock is fed out, turning operations are done, and the piece is finished. *Robert Wiedenholt, Brooklyn, NY*

Ed note: Note that there will be a radius at the bottom of the flats, corresponding to the radius of the milling cutters.

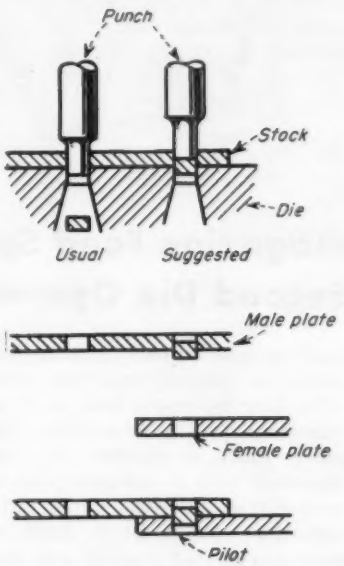


Slide Attached to Shear Catches Workpieces

A slide placed at the cutting edge of a shearing machine makes the work simpler. Pieces cut off slide down the table onto a truck, and can be easily handled without "shuffling" them together from the floor. *M Yamaguchi, Kawasaki, Japan*

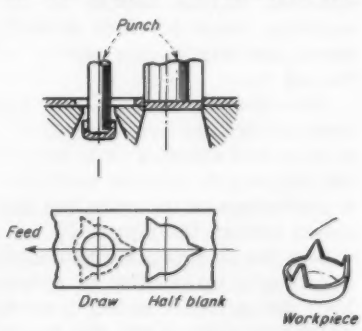
Half-Piercing Locates Parts For Rivets or Welding

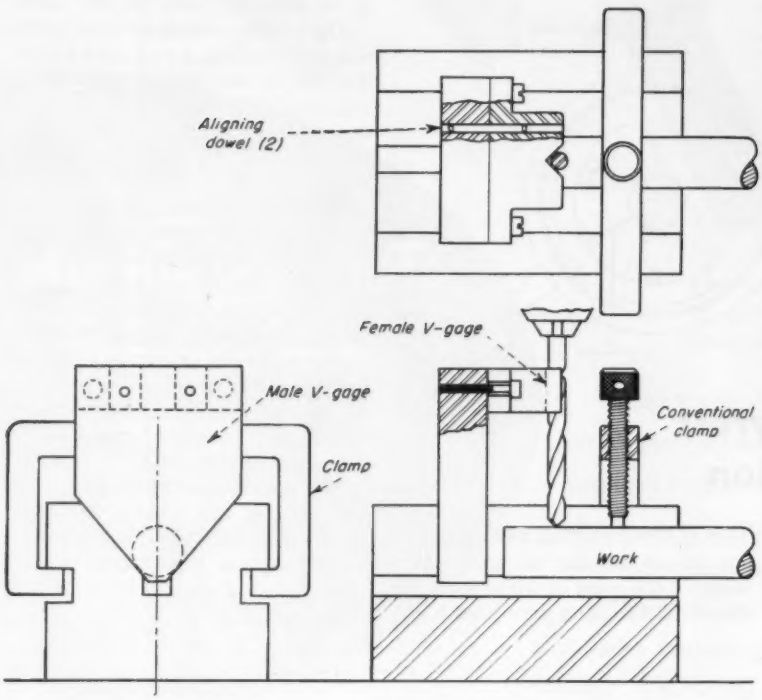
When parts are pierced in a press prior to riveting or spotwelding, it is sometimes more convenient to pierce them only halfway, leaving the blanked scrap in the plate.



Then when the parts are to be mated for spotweld or rivet, the scrap button serves as a pilot to locate the two parts, and no locating jig is necessary.

A variation of this idea is to half-blank a part which is to be further formed, and then move the part to a second station in a progressive die, where the half-blanked stock locates the part for the second operation. This method is sometimes preferable to blanking and drawing with a compound die. *M Yamaguchi, Kawasaki, Japan*





Double V-gage Centers Drills To Drill Round Stock

Toolmakers use several methods for drilling a hole squarely through center on round shafts. If the job calls for a hole which is cross-drilled through center within precise limits, the job can be somewhat complicated. A common method is to use the calibrated cross movement of a milling machine, to center the drill directly over the center of the work. If the only equipment is a drill-press and V-blocks, the job is difficult.

To solve this problem, we have made a small, simple setting gage, easily put together by any toolmaker, to be used with any V-block.

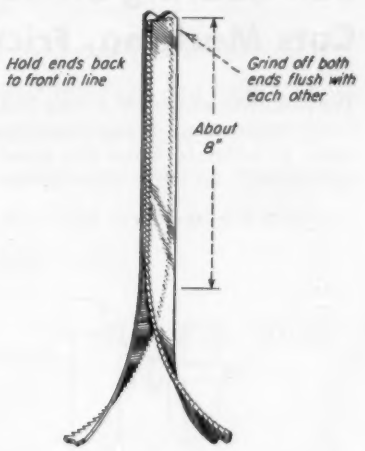
The male V-gage supports a small female V-gage which is secured with two screws after the centerlines of both V's are aligned. The male V-gage can then be moved along the V of any conventional V-block until the drill is snugly seated in the small female V-gage. The drill will then be on position, and the gage can be removed and work drilled. *H J Gerber, Stillwater, Okla*

Ed note: The gage might be improved if the male gage were clamped in position, and the female V-gage were replaced with a drill bushing plate, so mounted that the plate could slide up and down, to rest on top of the work. The proper size bushing could then be inserted to guide the drill, preventing "walking."

To cure bad tap breakage or poor reaming finishes on steel, try a cutting fluid of equal parts of powdered sulfur, beef tallow, cutting oil, and quenching oil. Degrease and tumble parts to remove sulfur. *Gus Wernberg, Geneva, NY*

Chalk Aids Filing

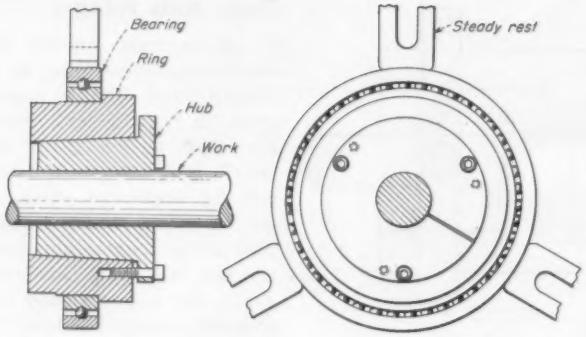
A simple trick, known to many old-timers, helps filing to a good, smooth finish. Simply apply white chalk to the file teeth before filing. The loaded teeth will not "bite" into the work, and finish will be improved. Also, any oil on the work, which makes filing practically impossible and ruins the file, will be picked up in the chalk. The aid of a good file brush or comb is needed to keep the teeth in just the right condition. *R Isetts, Kenosha, Wis*



Half-Twist Helps Match Butt Ends Of Saw Blades

There is an old trick, known to some machinists and millwrights, for perfectly matching the ends of saw blades, prior to butt-welding the ends together. It is surprising how many men do not know of this method, in which it is not even necessary to use a square to check the results.

All that is done is to twist the ends, to bring the back of one end of the blade even with the front of the other end. These ends are held in alignment by hand, and the ends are ground flush with each other. The result is a perfectly matching joint, more accurate than most people can make by grinding and checking each end separately. *H J Gerber, Stillwater, Okla*



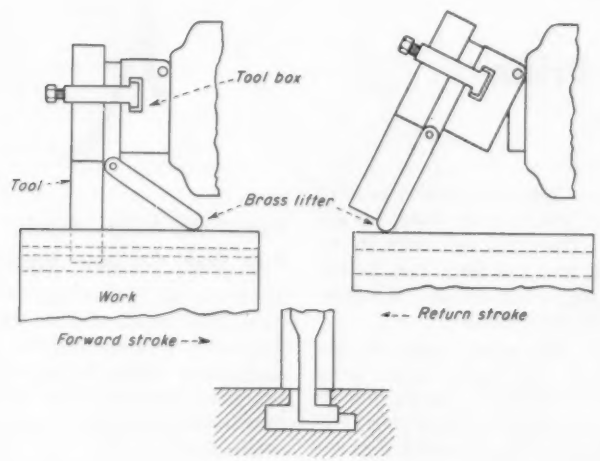
Ball-Bearing Steadyrest Cuts Marking, Friction

Turning long shafts on a long bed lathe requires one or more steadyrests. In order to avoid the usual difficulties, we built the device shown. The resulting fixtures eliminated all scoring on the shafts, stopped the mess of white lead, reduced friction, and permitted higher speeds and feeds on the lathe.

The fixture is made of three parts —a ball bearing, a ring, and a hub. The ID of the ring is taper bored and the OD is turned with a shoulder, and pressed into the large ball bearing. The inside taper of the ring fits the commercial split tapered hubs which are used with V-belt sheaves. The ring is drilled and tapped so the tapered hub can be pulled into it and locked to the shaft. The split hubs are available to fit all standard shafts. If necessary, the ID can, of course, be bored out for a special size of shaft.

The hubs have tapped holes in the flange, for three screws to be threaded to dismantle the hub.

We made two of these fixtures—the smaller one taking hubs for shafts from 1 3/16 to 3 in. diameter, the larger one, from 2 7/16 to 5 in. diameter. *Robert W Warner, Brooklyn, NY*



Brass Lifter Aids Undercutting In Planer

When undercutting on a planer, such as making T-slots on a machine table, the tool must be lifted clear of the work, because the capacity of lifters on the machine is limited.

To lift the tool, put a hinged strip of brass behind the tool clamped in the box. On the forward stroke, the hinge trails on the workpiece. On the return stroke, the hinge falls into place, lifting the tool clear. *R K Edwards, Lancashire, England*

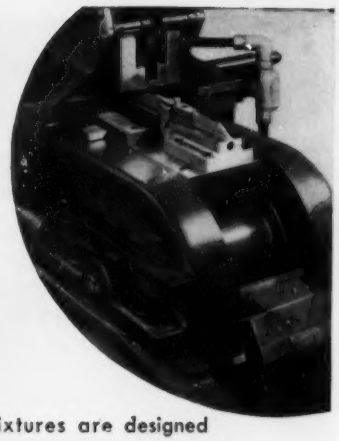
Stepped Plates Aid Mike Reconditioning

To recondition micrometers which may have worn or been dropped, making the surfaces not parallel, there is a simple method, common in Europe, but which I have not seen described elsewhere.

Five plates or disks, of fine cast iron, are ground and lapped in thicknesses corresponding to the five equal steps of one revolution of the barrel of the micrometer—say, 0.255, 0.260, 0.265, 0.270, and 0.275 in.

The measuring surfaces of the micrometer are then lapped, with very fine compound, by inserting the disks consecutively, slightly closing the screw on each, and rotating the disk back and forth. The cycle is repeated several times, depending on the amount of wear, until the newly lapped surface is even. *M Barash, Haifa, Israel*

Ed note: This works a little better if the surface of the disks is crisscrossed in a waffle-like pattern, to provide a series of cutting edges across the surface of the disk.



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MACHINE TOOLS

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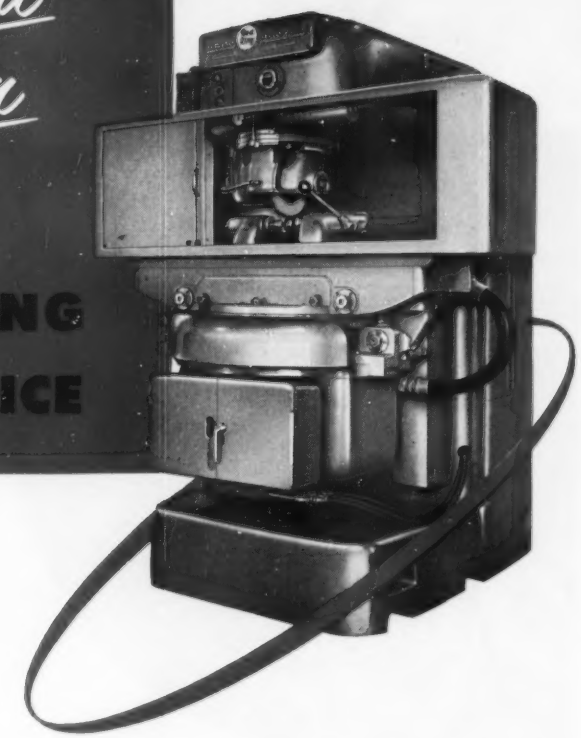
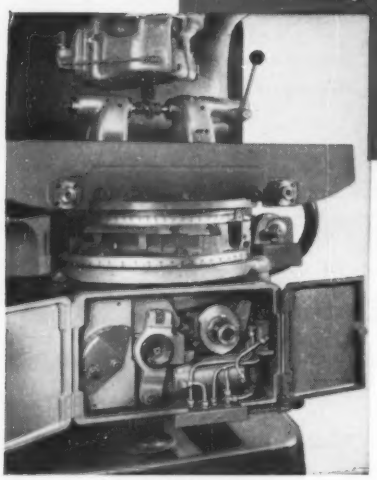
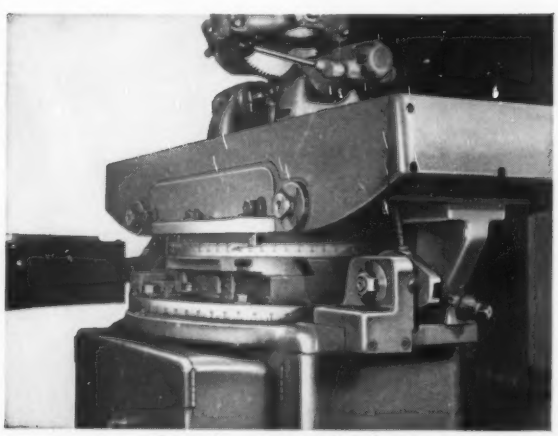




Differential up-feed mechanism



Crowning cam and bracket

Two new features are now optionally available with the Red Ring Gear Shaving Machine Model GCU — Automatic Differential Up-feed and Conventional Crowning. So equipped, any of the recognized processes in the field of rotary gear shaving may be performed on this machine. It thus becomes economically applicable to both high production and to job shop operations and to gears of all characteristics within its size range.

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Write for Bulletin S53-7 which gives all the details of this important new development.

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Difference Curves Solve Form-Tool Corrections...I

OLIVER SAARI, development engineer, ILLINOIS TOOL WORKS INC, CHICAGO 39

The problem of obtaining the corrected shapes of form tools is a recurring one in many tool-design departments. The two main types are circular tools (Fig. 1) and flat or "dovetail" types (Fig. 2). Various mathematical and graphical methods of obtaining tool profiles from given work forms have been proposed and used, but the majority of such tools can be more easily and accurately designed by the method of *difference curves*.

The method consists essentially of separating the complicated problem into two parts: (1) an easy operation, such as addition or subtraction, which represents the major variations involved, and (2) a plotted curve or graph from which the small additional variations can be read accurately. Form-tool correction is ideally suited for solution by this method because of these considerations:

1. The operation occurs repetitively, thereby justifying initial computation and curve-plotting.
2. The maximum required accuracy is well defined, and 0.0001 in. is sufficient for the most extreme cases.
3. The quantities involved are strictly limited by the size of stock that any given machine will handle. Thus, curves constructed for a given range of values cover all possible cases.

The method of computing the difference curves will be shown for the two main cases, from which the extension to other types should be obvious.

CASE I: EXTERNAL CIRCULAR FORM TOOLS

Fig. 1 shows the geometric relationships involved. Ordinarily, the exact solution of the problem would be obtained as follows: For given values of the maximum tool radius R_o (which is a constant for any given machine), center offset C, tool sharpening offset h, and minimum work radius r_o; to find values of tool radii R corresponding to given work radii r. The exact solution of this problem, using the symbols defined in the drawing, is:

$$p = \sqrt{r^2 - r_o^2 \sin^2 \theta} - r_o \cos \theta$$

$$R = \sqrt{R_o^2 + p^2 - 2R_o p \cos \alpha}$$

Where the work profile has a series of steps, angles, or curved forms, the above computation must be done over and over for many different values. The complexity of the formulas has driven many designers to the use of graphical methods, which are often more practical than mathematical solutions

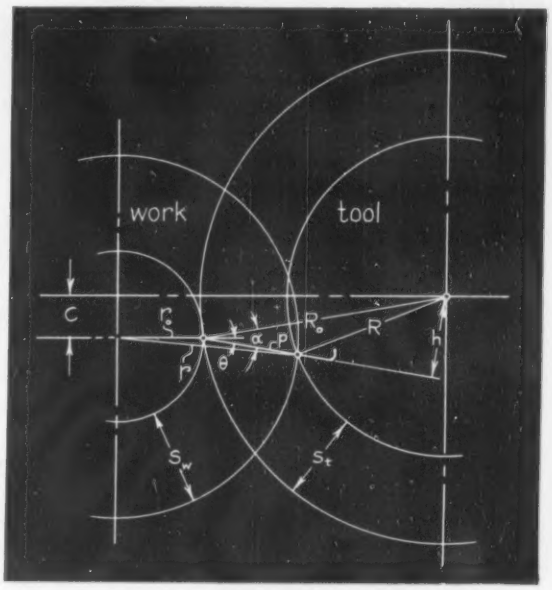

FIG. 1 . . . Geometric relationships in circular form tools

but are always dependent on the skill of the draftsman and the quality of his tools.

The solution of the problem with difference curves is obtained thus:

Let

$$s_w = \text{step on work} = r - r_o$$
$$s_t = \text{step on tool} = R_o - R$$
$$\Delta = \text{difference} = s_w - s_t$$

The step on the tool is usually shorter than the step on the work; hence the difference Δ is usually positive as defined above. It is a small-enough quantity over the entire range of most practical tool problems to be plotted and read accurately on ordinary graph paper. The problem is usually that of finding values of s_t corresponding to known values of s_w. Thus, the difference Δ must be plotted against s_w. Various values of Δ are obtained from the curve, and corresponding values of s_t are obtained from $s_t = s_w - \Delta$ in any form-tool problem.

The computation is made easier by using the parameter p, shown in Fig. 1, which is distance measured along the sharpening plane of the tool. From arbitrary values of p, corresponding values of r and R

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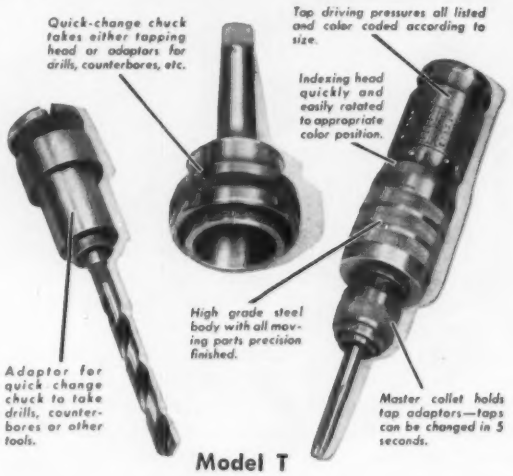
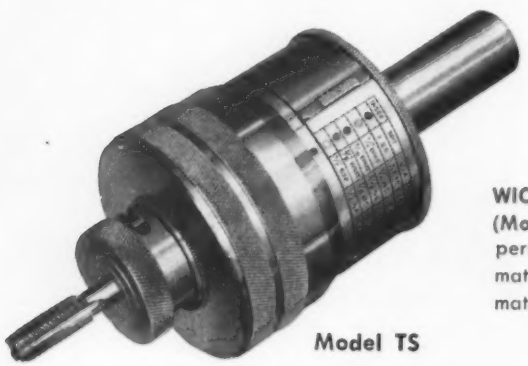
Models K & T sizes and range: from 3/16" to 1 3/4".


Quick-change chuck takes either tapping head or adaptors for drills, counterbores, etc.
Tap driving pressures all listed and color coded according to size.
Indexing head quickly and easily rotated to appropriate color position.
High grade steel body with all moving parts precision finished.
Adaptor for quick change chuck to take drills, counterbores or other tools.
Master collet holds tap adaptors—taps can be changed in 5 seconds.

Model T



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WICKMAN TAPPING ATTACHMENTS FOR TURRET LATHES (Model TS) are considerably shorter than Models K & T. They also permit presetting of tapping torque required for any tap size or material, thus preventing tap breakage in blind hole tapping or materials difficult to tap.

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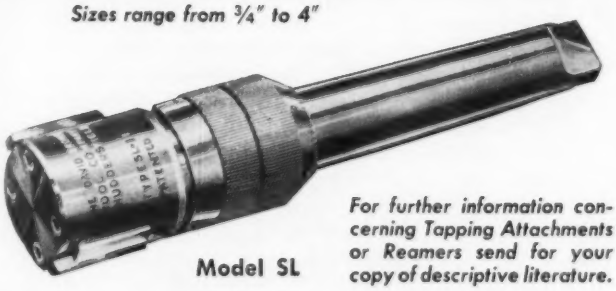

Model SL

For further information concerning Tapping Attachments or Reamers send for your copy of descriptive literature.

THE Wickman MANUFACTURING CO.
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Difference Curves Solve Form-Tool Corrections... II

are obtained. The differences in the steps are obtained as shown above, and these are plotted against the corresponding values of s_w to obtain the required curve. The following formulas can be used:

The tool front angle α and rake angle θ are constants which should be determined from

$$\sin \alpha = \frac{h}{R_o}$$

$$\sin (\alpha - \theta) = \frac{C}{R_o}$$

Values of R and r are obtained from values of the arbitrary parameter p from

$$R = \sqrt{R_o^2 + p^2 - 2R_o p \cos \alpha}$$

$$r = \sqrt{r_o^2 + p^2 + 2r_o p \cos \theta}$$

In the case where the sharpening offset and center offset are the same, the rake angle θ is zero and the step on the work, s_w, does not depend in any way on r_o being exactly equal to p. A single curve plotted on ordinary graph paper can easily give the differences to an accuracy of 0.0001 in. When the rake angle is small, r_o has little effect and a single difference curve can still be made to give sufficient accuracy for all tool computations. However, with larger rake angles the curves become more and more affected by r_o, and at some stage it may be desirable to draw several curves, computed for different values of r_o, giving the required accuracy without interpolation.

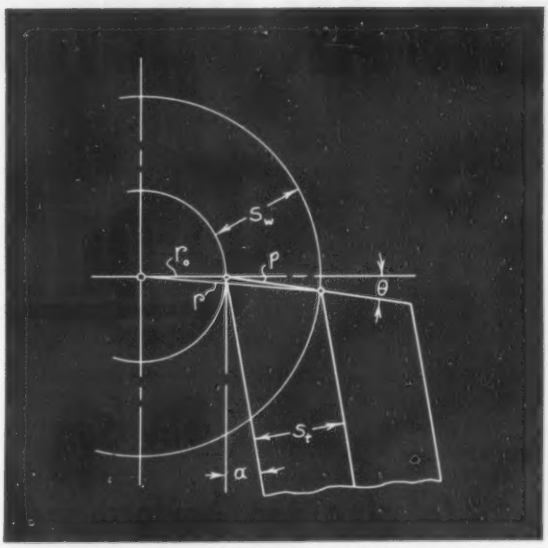

FIG. 2 . . . Geometric relationships in dovetail form tools

The given circular form tool example deals with tools for a No. 2 Brown & Sharpe automatic screw machine. A table similar to Table I should be constructed for each sharpening offset or rake angle θ (this being usually confined to two or at most three values). In Table I the sharpening offset $h = 0.3125$ in. is the standard value used by a major automotive manufacturer's tool-design department. Since the maximum work radius in this case is 0.5 in., only the ranges shown in the table need to be calculated. It can be seen that a single curve of average values gives an accuracy of 0.0001 in. for all possibilities. Two curves are sufficient for an offset of $h = 0.375$ in., computed for values of $r_o = 0$ and $r_o = 0.2$.

If the rake angle is further increased by increasing the sharpening offset, it may be found that separate curves must be drawn for $r_o = 0$, $r_o = 0.1$, $r_o = 0.2$, $r_o = 0.3$, $r_o = 0.4$. These five curves will be the maximum required in any practical case. All the curves for a given tool size and different sharpening offsets can be drawn on a single sheet of graph paper as shown in Fig. 3, which shows curves for the No. 2 B & S machine.

TABLE 1 . . . Difference Curve Data for Form Tools Used on No. 2 B & S Automatics

R_o = largest radius of tool = 1.5 in.
C = center offset = 0.25 in.
h = tool sharpening offset = 0.3125 in.

α = 12.025 deg
cos α = 0.97806
θ = 2.431 deg
cos θ = 0.99910

Arbitrary Parameter	Step on Tool	Corresponding Step on Work ($r-r_o$) for Various Minimum Work Radii				
p	$(R_o - R)$	$r_o = 0$	$r_o = 0.1$	$r_o = 0.2$	$r_o = 0.3$	$r_o = 0.4$
0	0	0	0	0	0	0
0.10	0.09765	0.10	0.09996	0.09994	0.09993	0.09993
0.20	0.19494	0.20	0.19994	0.19991	0.19989	
0.30	0.29180	0.30	0.29993	0.29989		
0.40	0.38810	0.40	0.39993			
0.50	0.48368	0.50				

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Difference Curves Solve Form-Tool Corrections ... III

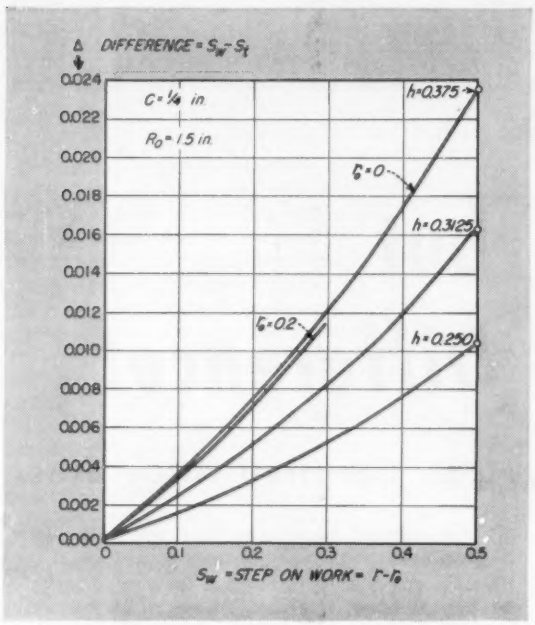


FIG. 3 . . . Circular form-tool difference curves for No. 2 B & S automatic screw machine

A typical tool-design example to be solved is shown in Fig. 4. Let the desired tool be for the No. 2 B & S machine, with a sharpening offset $h = 0.3125$ in. Angles and radii on the work must be converted into a series of steps as shown. Axial dimensions, such as a_w, remain constant. The values in the examples are $r_o = 0.100$, $s_{w1} = 0.275$, $s_{w2} = 0.208$, and $s_{w3} = 0.4375$. The corresponding differences are read from the curve in Fig. 3, and subtracted from the above values to give $s_{t1} = (0.275 - 0.0073) = 0.2677$, $s_{t2} = (0.208 - 0.0052) = 0.2028$, $s_{t3} = (0.4375 - 0.0134) = 0.4241$.

To show the reliability of the method, these steps were also computed with the exact formulas, giving values of 0.26770, 0.20277 and 0.42410.

In the particular example shown, it is convenient to compute a corrected radius ρ_t on the tool profile, to correspond very nearly to the form radius ρ_w on the work profile. Any radius ρ can be obtained from its chord length a and depth d by means of the following formula:

$$\rho = \frac{a^2 + 4d^2}{8d}$$

Thus, using the previous system of subscripts to indicate corresponding dimensions on the tool and on the work, it is seen that if $a_w = a_t = 0.500$ and $d_t = 0.0650$ (obtained by subtracting the calculated steps on the tool) then

$$\rho_t = \frac{a_t^2 + 4d_t^2}{8d_t} = 0.5133$$

The corresponding form radius ρ_w on the work was 0.500, so that there is seen to be a substantial correction.

Angles should be computed by obtaining their corrected tangents in the obvious manner.

CASE II: DOVETAIL FORM TOOLS

The method here is entirely analogous to the previous method, but somewhat simpler. Steps on the tool and work corresponding to arbitrary values of the parameter p are obtained from the following formulas:

$$s_w = \sqrt{r_o^2 + p^2 + 2r_o p \cos\theta} - r_o$$

$$s_t = p \cos(a + \theta)$$

from which the differences Δ are obtained and plotted against s_w as before. The meaning of the symbols used here is shown in Fig. 2.

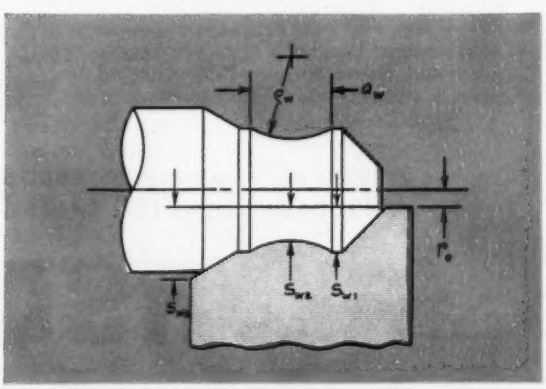
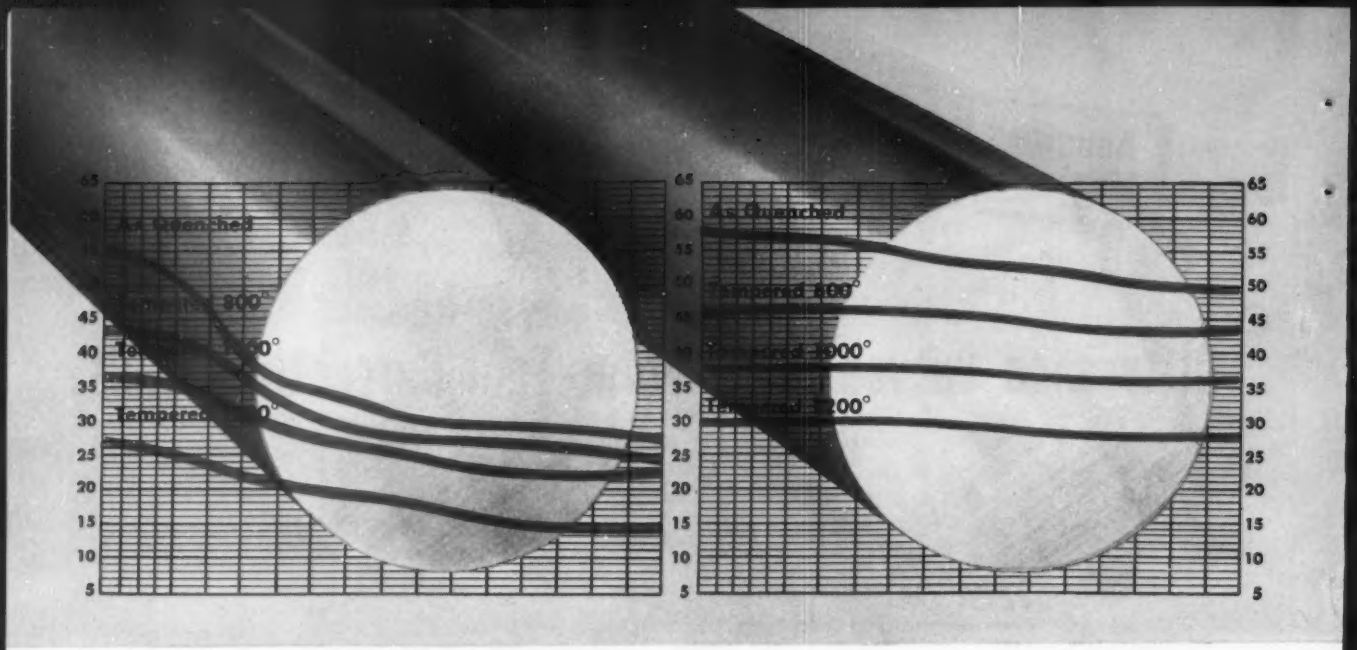


FIG. 4 . . . Typical form-tool design problem



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Graphic Reason for Using Ryerson Certified Alloy Steel

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TALKING SHOP

Weird Aids

SWEDISH BLONDES, 4-legged helpers, and man-made perspiration are research aids at Minneapolis-Honeywell's research labs. Apparently, Swedish blonde hair is the best reacting element for humidity-measuring devices — far better than pig bristles, horsehair, or even brunette or redhead hair. The 4-legged helpers are white rats, used to check new plastics to avoid rodent damage in service. As to man-made perspiration, that's trouble for product finishes. But it is surpassed for testing purposes by a synthetic brew — a chemical formula — which maintains its composition. Perspiration changes in chemical composition from person to person and day to day.

It Eats the Pipes

WE HAVE PLUGGED these many years at the idea that engineering writing should be simple and straightforward, not cluttered with jargon. Our articles, we trust, exemplify that idea, because effective writing makes understanding quick and easy for the reader. This story, told by W H Butterfield in *Credit World*, makes our point: A plumber wrote to a Government Bureau that he'd found hydrochloric acid opens plugged pipes quickly, and asked whether it is a good thing to use. Wrote a Bureau scientist:

The uncertain reactive processes of hydrochloric acid place pipe in jeopardy when alkalinity is involved. The efficacy of this solution is indisputable, but the corrosive residue is incompatible with metallic permanence.

The plumber wrote back, thanking the Bureau for telling him this method was all right. The scientist was disturbed about the misunderstanding, and showed the correspondence to his boss—another scientist—who immediately wrote the plumber:

Hydrochloric acid generates a toxic and noxious residue which will produce submuriate invalidating reactions. Consequently, some alternative procedure is preferable.

The plumber wrote back that he agreed with the Bureau—hydrochloric acid works just fine. Greatly disturbed, the two scientists took their problem to the top boss. The next day the plumber received this telegram:

Don't use hydrochloric acid. It eats hell out of the pipes.

Tape Compass

A SWEDISH INVENTOR, H Kultner, has come up with a combination beam compass and measuring device which is really a plastic tape or a drum. The tape is 5 ft long, graduated in millimeters and inches on one face, and with two patternmaker's shrink scales on the other. A lock enables the tape to be extended to any desired length and held there, and a tack built into the case provides the pivot. A scriber, pen or pencil can be set into a slot at the tape end.

5½ Million

YOU MAY RECALL we mentioned (*AM* —Feb 1 '54, p177) the ultra-thin nickel-moly steel rolled by Armco at $2 million a ton. One of the editors goes beyond that to figure how much of the alloy that would be. At the reported thickness of ⅛ thousandth, a ton would cover about 5½ million square feet.

Bedsheet and Bacardi

SOME OF THE BEST DESIGNS for special machines have been drawn on hotel napkins, tablecloths, and even bedsheets. Ed Smith, president of Seneca Falls Machine Co, remembers one case in which sketches on a hotel bedsheet were the basis for the design of five special machines, and the designing was considerably helped by a gallon of Bacardi originally in possession of one of the conferees, but ultimately uniformly distributed among the group.

3D Pix Again

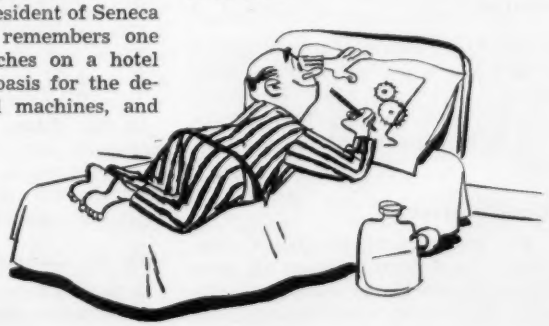
SAWYER'S INC, Portland, Ore, maker of those disks used in the children's "View-Master" for 3D pictures, reports increasing industrial use of the 3D technique, particularly with the burgeoning use of 3D camera by amateurs and the availability of reasonably priced projection equipment. It's an ideal way to show complex dies, floor layouts, and the like.

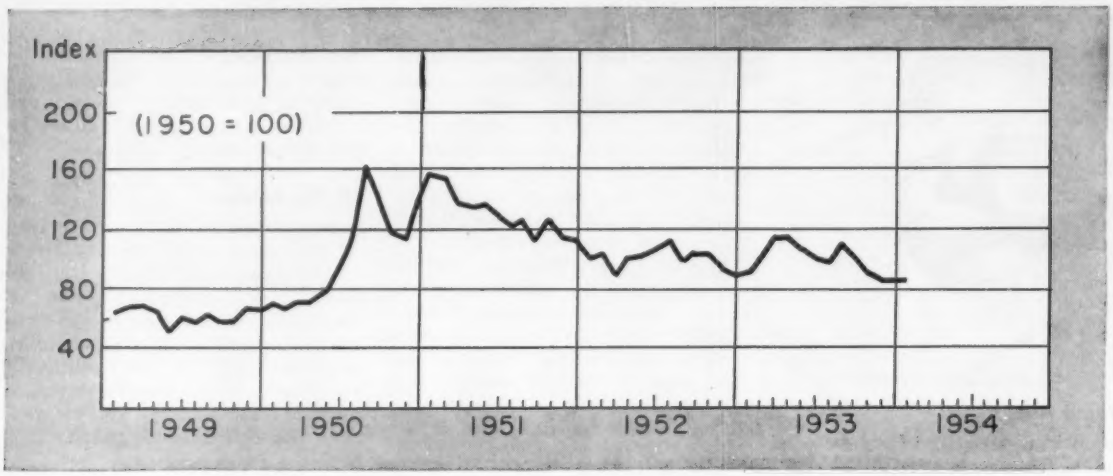
Debunker

FRANK L BOGART of Marblette Corp, New York, a plastic supplier, debunked some more-sweeping claims for plastics at the recent meeting of the Steel Plate Fabricators Assn in Chicago. He pointed out that for some applications, plastic dies can cost more than metal ones. Best plastic applications are for test and short runs. Sometimes, phenolics work well for runs of 10,000 to 20,000 pieces, particularly with steel inserts to prevent erosion at sharp radii or wrinkle points. On long runs, plastic dies are cheaper to make, but cost more in many cases because of lost time for die repairs and maintenance. Plastic locating and nest blocks may be used, however, on such dies.

Busted Record

GM'S SUGGESTION PLAN broke all records in 1953. Awards totaled $2,419,709.68, up 44% over the previous high in 1952. Some 181,592 suggestions were submitted by 80,309 people, up more than 25%. During the year, 60 maximum awards of $2,500 each were paid, as compared with 39 in 1952.





McGRAW-HILL INDEX OF NEW ORDERS FOR MACHINERY 1949-1954 (seasonally adjusted)

Index of New Orders for Machinery

(except electrical)

Which way is the business wind blowing? Published here for the first time, McGraw-Hill's monthly Index of New Orders for Machinery, based on a cross-section sampling of US industry, provides an always-current weathervane for business trends

NEW YORK — A brand-new McGraw-Hill Index of New Orders for Machinery — devised, tested and finally announced by McGraw-Hill Publishing Co's Department of Economics, measures monthly changes in new orders for industrial machinery and parts (excluding electrical) received by machinery manufacturers. The Index is on both a seasonally adjusted and an unadjusted basis, with the year 1950 taken as the base period of 100. Adequate data for earlier years could not be secured.

The Index reflects dollar value of orders and is not adjusted for price changes. It has been computed monthly from January 1949 to date and is here published for the first time.

Broad Coverage

For purposes of the Index, machinery is defined to mean all non-electrical machinery and parts except hand tools, operating supplies, consumer items and farm equipment. Foreign and government orders are included, except for Ordnance items.

Covers Group 35

Coverage generally is limited to major industrial group No. 35 (except electrical) of the Standard Industrial Classification Manual, which includes:

- Engines and turbines.
- Tractors and farm machinery.
- Construction, mining machinery.
- Metalworking machinery.
- Special industrial machinery.
- General industrial machinery.
- Store and office machines.
- Household and service machines.
- Miscellaneous machinery and parts.

Of the above, tractors and farm machinery and the last two groups are not covered in the Index, as they do not represent industrial capital equipment.

How It's Computed

A shuttle form is sent each month to companies representative of a cross-section of machinery industries, companies accounting for a third of all non-electrical machinery sales. The companies return the form after entering their latest figures for value of new orders received. The returns are then tabulated for each classification.

Each company is assigned to the classification into which the largest proportion of machinery shipments in the base period fell. All of the company's new orders for non-electrical machinery are entered in this one classification, except for those few companies reporting breakdowns by product.

Indexed by Product

In computing the Index, the first step is to figure separate indexes for each product classification. Then the aggregate for each of these is compared to its 1950 aggregate. This gives a monthly index for each industry group.

Weighted Averages

The six monthly indexes are then combined in a weighted average, with weights based on industry shipments in 1950. Then each industry group index is multiplied by its weight, the six are added, and the total divided by 100 (the sum of the weights). The result: the monthly Index of New Orders of Machinery (1950 = 100), unadjusted seasonally.

	Index (adjusted)	Index (seasonally adjusted)		Index (adjusted)	Index (seasonally adjusted)		Index (adjusted)	Index (seasonally adjusted)
1949	**60**		**1951**	**130**		**1953**		
Jan	65	62	Jan	169	159	Jan	94	89
Feb	71	67	Feb	163	152	Feb	104	97
Mar	76	67	Mar	155	136	Mar	130	114
Apr	63	61	Apr	136	133	Apr	117	114
May	50	48	May	140	134	May	111	107
June	58	57	June	132	129	June	101	99
July	49	55	July	109	122	July	87	97
Aug	53	59	Aug	112	124	Aug	96	106
Sept	50	57	Sept	99	111	Sept	86	97
Oct	53	55	Oct	120	125	Oct	88	92
Nov	60	63	Nov	109	115	Nov	84	89
Dec	67	64	Dec	116	110	Dec	88	83
1950	**100**		**1952**	**98**		**1954**		
Jan	71	67	Jan	106	100	Jan	89	84
Feb	68	64	Feb	107	101	Feb		
Mar	78	68	Mar	100	88	Mar		
Apr	70	68	Apr	101	99	Apr		
May	82	78	May	103	99	May		
June	93	91	June	106	104	June		
July	99	110	July	98	109	July		
Aug	148	163	Aug	87	96	Aug		
Sept	122	138	Sept	91	102	Sept		
Oct	114	119	Oct	98	102	Oct		
Nov	109	115	Nov	88	93	Nov		
Dec	145	137	Dec	93	88	Dec		

Announced by McGraw-Hill

Seasonal Adjustment

Machinery orders display a fairly pronounced seasonal variation. New orders are usually low in the summer, high in the winter. Intelligent month-to-month comparisons cannot be made without accounting for seasonal variation.

This variation is calculated for the general Index, rather than for the group indexes. This cuts down the effect of unusual fluctuations reported by individual companies, fluctuations that could distort the group indexes.

Seasonal corrections are made using a centered 12-month moving average, plus additional adjustments because the Index covers only five years. The resulting seasonal indexes eliminate a large part of the regular seasonal fluctuations.

As the McGraw-Hill Index of New Orders of Machinery is the only currently available measurement in this field, its validity cannot be checked. But comparison of indexes for two of the industry group samples with industry-wide indexes for these groups show markedly similar movements. However, the greater sensitivity of the McGraw-Hill Index is revealed in more pronounced month-to-month fluctuations. The Index will appear monthly in subsequent issues of *American Machinist*.

ODM Delays Decision on Biggest US-Tool Lease Case

WASHINGTON — Office of Defense Mobilization has postponed action on the biggest case to date involving leasing of idle government-owned machine tools for normal commercial use.

The case involves Brown & Root, Inc, Houston, Texas, engineering and construction firm, which wants to lease $5.8 million worth of Ordnance tools for five years. Their purpose: to set up a job order machining business for Southwestern metalworking firms.

The tools are part of a $10 million Army Ordnance production line installed in a $1.8 million plant built by Brown & Root since Korea, aided by accelerated tax amortization on 75% of the plant's value. The plant has been used to make hulls, turrets, other tank components.

Upon completion of the tank contract, Ordnance planned to mothball the plant under the Standby Production Plan, paying Brown & Root to maintain the equipment. But now the firm wants to use half the tools for civilian work.

B & R proposed tool rental be charged against maintenance payments and if the Army refused, wanted the tools taken out of the plant, which, incidentally, it refuses to sell to Ordnance.

Both Ordnance and the Defense Dept at first okayed the proposal. And they recommended that ODM approve it too, on grounds that removal of the production line would mean scrapping of $3 million in concrete-embedded equipment—plus cost of $1.8 million to transport the remaining tools to US storage.

That put ODM on the spot. The proposal was strongly backed by Rep Albert Thomas, ranking Democrat on the House Appropriations Committee in charge of ODM's budget. On the other hand, the deal is contrary to ODM's general ban on leasing idle US machine tools for non-defense use, although it has made two exceptions.

But ODM was spared a decision on January 29, when the Pentagon suddenly requested that the lease be delayed until the FBI could check alleged irregularities in B & R's tank operations.

AMTDA to Expand Services To Machine Tool Industry

Welcome sign will be hung out for machine tool builders at all future meetings, distributors group announces at its spring meeting

BOCA RATON, FLA — A major expansion in the activities of the American Machine Tool Distributors Association, together with an increase in dues to finance the program, won the unanimous approval of members present at the Association's spring meeting here March 3-4. The expansion plan will be submitted to the Association's 200 members for approval.

"This program is the logical culmination of the Association's growth during the past 30 years," Thomas R Rudel, AMTDA's president and president of Rudel Machinery Co, said in commenting on the plan which was formulated and approved by the Association's Executive Committee. "The expanded activities will make it possible for our Association to better serve the machine tool builders whom members represent."

Mr Rudel announced that builders will be welcome at all general sessions of the AMTDA as an Association policy. The 1954 fall meeting will be held at the Sheraton-Gibson Hotel in Cincinnati October 21-22. A feature will be a dinner meeting to which all members of the National Machine Tool Builders' Association will be invited.

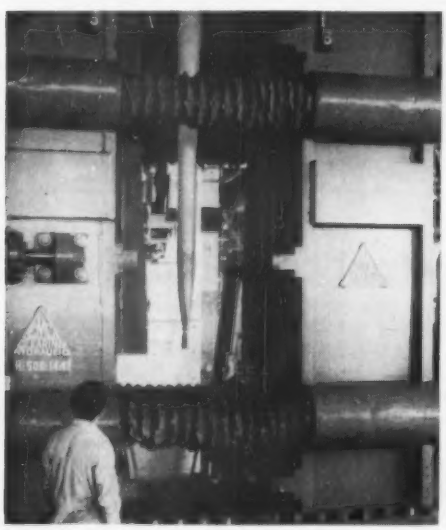
A report will be made to the fall meeting on various rental plans for machine tools, Mr Rudel said. The committee making the report will consist of Frederick B Scott, president, Syracuse Supply Co; James D Germain, Germain Machinery Co; and E Franklin Motch, president, Motch & Merryweather Machinery Co.

Commerce Dept's Business and Defense Services Administration does not want to do for industry anything that industry can do for itself, BDSA Administrator Charles F Honeywell told members. It will not plead the cause of any industry before other government agencies, but will open the door so that industry representatives can state their case to the right people.

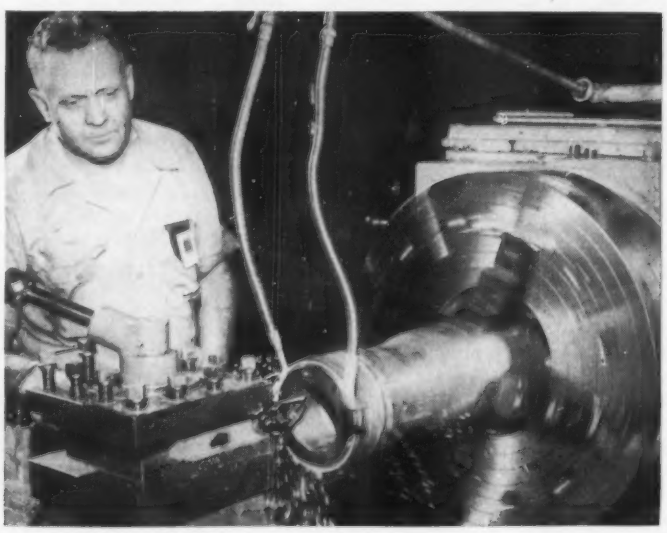
Industry Advisory Committees

Mr Honeywell said that Industry Advisory Committees, of which there were 552 with over 7000 members at NPA's peak, are being reactivated only when they can serve a useful purpose. Trade association executives have been participating actively in the new BDSA Advisory Committees, a reversal of NPA policy.

Subsidies to foreign competitors of the machine tool industry, particularly German builders, probably will be eliminated soon, he said, revealing that BDSA will shortly



Forming ...



Machining ...

Dodge Sets Up West Coast's First Major

SAN LEANDRO, CALIF — West Coast's first major airplane propeller manufacturing operation is now in full swing here in a new addition to Chrysler Corp's Dodge auto body assembly plant. About 150,000 sq ft of floor space is given over to production of Hamilton Standard prop blades for Boeing C-97's. and the plant will shortly be assembling full four-bladed propeller assemblies, using hub and control parts produced at Chrysler's Warren, Mich, plant. Propeller cores are heated in a sub-level furnace traveling on rails be-

release a report on exports and imports of machine tools. Mr Honeywell indicated his belief that depreciation allowances for production equipment may be further liberalized beyond any legislation this year in '55.

A very good machine tool year, with production and shipments crowding $1 billion, was forecast by Mr Honeywell, whose breakdown of the sources of this business appears on page 111.

Discard Bulletin F?

Internal Revenue Service's Bulletin F should be discarded as a basis for computing taxable life of machine tools, Raymond A Vidinghoff, president, Machinery Associates, Inc, reported. He pointed out that thousands of letters advocating a policy of optional depreciation of machine tools have been written to Congress by machine tool users and distributors. In addition, hundreds of personal contacts have been made by industrialists with Congressmen.

Mr Vidinghoff stressed that if a manufacturer can take a realistic useful life figure as the base, the government's plan for doubling the depreciation rate and using the "declining balance method" offers a real incentive to a manufacturer to replace, modernize and expand, facilities."

The leasing or sale of government-owned machine tools to private industry is a much more serious problem today than in WWII, if such policy should become prevalent, because of the government's ownership of a much higher percentage of the nation's machines (20%) now than then, Henry R Hanson, vice president William K Stamets Co, said.

Asks Inventory of US Tools

He brought out the fact that government-owned tools actually are the property of US taxpayers to be used for defense purposes only. He suggested that an inventory of government tools be made by competent machine tool men.

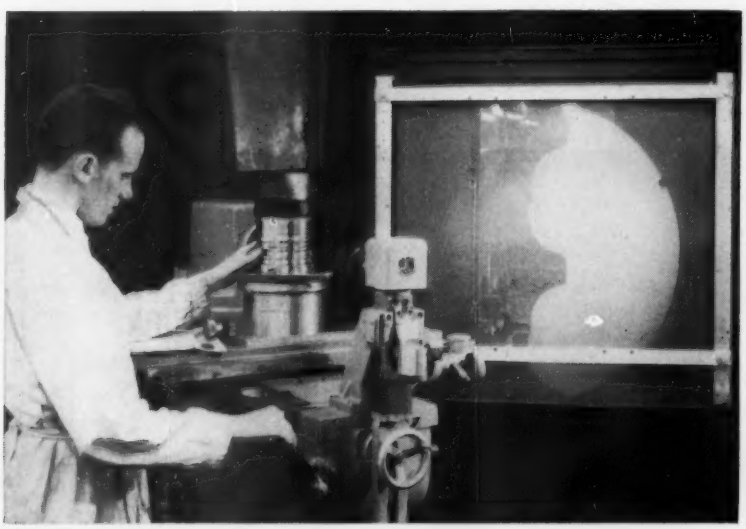
Getting the Federal government's depreciation policy liberalized is just the beginning, Tell Berna, general manager, National Machine Tool Builders' Assn, warned members. The big job following the change in the law liberalizing rates is to get machine tool users to take advantage of the new policy. Machine tool salesmen should be told the basic principles of depreciation and then employ them in their selling, he said.

If all the machine tools in US metalworking industries over 20 years old were replaced, Mr Berna estimates the machine tool industry would be busy at its 1952 production rate ($1.1 billion) for four years.

He based his prediction upon the 1953 American Machinist Inventory of Metalworking Equipment.

Mr Berna deplored the Foreign Economic Administration's policy of advising Japan, Formosa and Spain to buy machine tools with US money wherever they can get them the cheapest. He said that machine tool imports into this country have been running about $3 million a month, down 25% from 1953. He brought out the point that if government-owned machine tools are leased for civilian work, the lessee in an emergency is likely to resist returning the machines to the armed services, knowing that he himself probably will need them.

Selling the capitalistic system to everyone with whom they come in contact is machine tool distributors' biggest selling job, Robert L. Giebel, Giebel Inc, told members. The distributor's task is to find means of producing faster, better and cheaper. The results of these efforts will be to create more efficient use of labor. "Machine tools are capital at work," he said. "Progressive countries and healthy machine tool industries are inseparable."



Checking ...

Aircraft Propeller Plant

low a two-story press (left photo): when cores reach cherry-red heat they are hoisted into position between forming dies. Core is then machined on turret lathe (center), and shank and bore dimensions are checked on optical comparator (right photo shows magnified image of raceway for ball bearings at base of reversible prop).

ADAMAS CARBIDE MOVES TO BIGGER PLANT

KENILWORTH, NJ—For the third time in 11 years, Adamas Carbide Corp has expanded its operations, moving into a new $1 million plant in this city. The move is designed to increase production 50% over operations in the company's former plant at Harrison, NJ.

The new plant, incorporating latest developments in straight-line production and quality control, has scientifically controlled atmospheric conditions throughout.

Laboratory space has been doubled, and the new plant employs teletype and Western Union TWX services for exterior communications and intra-plant pneumatic tubes to speed production.

Wider Applications for Beryllium?

Does pure beryllium stand at the threshold of becoming an engineering material? ASM thinks so ... if its ductility can be improved

BOSTON—If beryllium can be made fine-grained and ductile in all directions, its use is possible in aircraft and ordnance applications, according to some 150 metallurgists meeting here for the two-day midwinter meeting of the American Society for Metals.

New Extruding, Rolling Techniques

MIT researchers showed how improved techniques in extruding powder metal and rolling of plates produces beryllium bars and sheet with much greater strength and ductility than were formerly known.

Beryllium, unlike titanium, is readily machinable and has the greatest strength-to-weight ratio of any stable metal. Its corrosion resistance is high in some applications.

Needed: still more ductility

Right now, beryllium has virtually no industrial usage except as an alloying element in an increasing number of materials. The pure metal needs more ductility in all directions. If researchers succeeding in improving the pure metal, production will go up and costs come down. Current cost is $60 per lb, and the metal will always cost several dollars per pound.

Joining Problem

Even if beryllium is improved so that it can be cupped, swaged, formed, upset and die forged, the joining problem remains. Fusion welding is no good because of weld cracks and oxidation. Pressure welding at elevated temperature has been improved. So has furnace brazing. But these processes require many hours per joint, special argon atmosphere or vacuum and special jigs. So prospects are for limited pure metal usage in specialized applications.

New "Miracle Alloy"? Non-Critical Thermenol Can Replace Stainless

Navy's new aluminum-iron alloy combines resistance to corrosion with high tensile and ductile strength, heat resistance and electrical resistivity

WASHINGTON—Thermonol, a high-temperature magnetic alloy developed by Naval Ordnance, is capable of replacing stainless steel in many applications — and it's made from non-critical iron (84%) and aluminum (16%). When either vanadium or molybdenum are added to it in the order of about 5%, the alloy combines a surprising number of properties in one material.

And Thermenol is 20-25% lighter than stainless steel, can heat to 1300 C with low heat losses. Unlike many aluminum-steel alloys now in general use, Thermenol isn't brittle and it can be developed for sheet use.

Protective Coating Forms

Thermenol's high resistance to corrosion and oxidation results from its high aluminum content. A protective coating of aluminum oxide forms on the metal.

In order to get a material practical for industry operations, Naval Ordnance metallurgists J F Nachman and W F Buehler worked out purity requirements for major materials at the industry level.

Preliminary creep-to-rupture tests show that at 1200 F Thermenol "is better than some forms of stainless steel" in aircraft use.

Particular advantage of the new alloy is its possible replacement of scarce alloying materials. Its lighter weight could cut down jet aircraft weight, and at the same time release scarce materials for other uses.

Although Thermenol can't compete with the so-called "super alloys" containing high percentage of cobalt, or with titanium alloys in certain applications, it can take the place of stainless steel in such applications as jet tail cones and aircraft exhaust systems, or in kitchen range and toaster heating elements.

And you don't have to redesign machine tools to use it.

Think You've Got Problems?

STEEL 6½-IN. THICK posed a knotty metalworking problem for Canada's Dominion Bridge Co, which subcontracted to build two huge weldments to be used as loading girders for the sliding table of a 50,000-ton hydraulic press being built by Loewy Construction Co, New York, for USAF Heavy Press Program

Packard Slates $50 Million Tooling For Initial Modernization Move

Transfer of engine, automatic transmission and axle manufacturing facilities to Utica, Mich, plant marks biggest move in company's 55-year history

DETROIT — More than 1000 new automatic machine tools and tooling are expected to be in place at Packard Motor Car Co's Utica, Mich, plant by September, ready for production of engines, automatic transmissions and axles, for Packard's 1955 model production run.

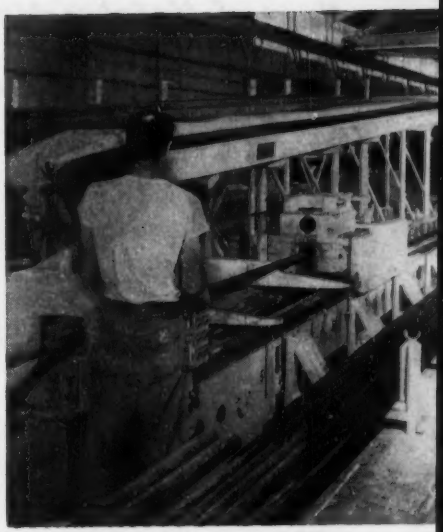
Acquisition of new tooling for the plant will cost in the neighborhood of $50 million—first step in a company-wide modernization program expected to cost $150 million.

Transfer of engine, transmission and axle facilities to Utica's 1.5-million-sq-ft plant frees about one-quarter of Packard's 4-million sq ft of manufacturing space in Detroit. And local speculation has it that the company may go into production of its own auto bodies in the freed space.

Basis for this thinking is that while Packard still buys bodies from Chrysler, it must inevitably pull away from dependence upon a competitor. And it can only do this in one of three ways: (1) it can build its own bodies—a choice involving large capital outlay and extensive plant remodeling, (2) it can look for another outside supplier—an arrangement that would leave Packard in pretty much the same hole it's now in, or (3) Packard could join American Motors Corp, which will have three auto body plants when merged.

Regarding the latter possibility, Packard President James J Nance has reiterated his earlier stand that he is not talking merger now, rather he is "still dressing up the bride." And the Utica move could be a "bride dressing" operation, or it could mean Packard is one independent that plans to put up a fight for the auto market.

But, speculation aside, Packard's Utica move is intended to get its costs down to a competitive level. The operation involves 3000-3500 workers.



West's Biggest?

LOS ANGELES—Claimed to be the largest West of the Mississippi, a 150,000-lb steel tube drawbench has been installed here at Pacific Tube Co's plant. Built by Aetna-Standard Engineering Co, the bench draws steel tube to 52-ft max length, up to 6½-in. OD. at 110 fpm; has overall length of 121 ft, is almost entirely automatic in operation, and is of single-chain, single-draw, double mandrell rod, 2-speed drive type.

OVER 66-FT LONG, the weldments are as much as 7-8 in. thick in places, have webs and flanges 3-in. thick. Girders weigh 60 tons, are 6-ft, 9-in. high

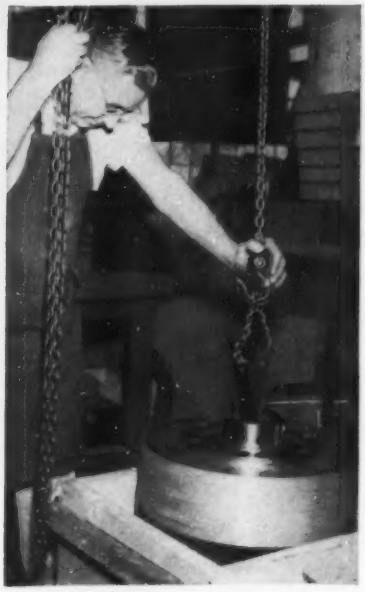
...Try Welding 6-½ In. Steel!

HOW WELDING WAS DONE. Preheating to 300-400 F made use of normal oil torch group welding difficult. Instead, Dominion preheated the 6½-in.-thick material by a system of block welding—preheating locally to 400 F, then welding for the full weld section in block increments

Chinese Tool Show in Moscow

TURNABOUT IN MACHINE TOOL EXHIBITS took place recently in Moscow when Red China displayed its newest machine tools. Previously, Russia and its European satellites exhibited their tools in Peking, and here China returns the compliment. But the Chinese tools must have looked awfully familiar to Russian audiences . . . they're mostly carbon copies of Russian models

Handle with Care . . .



. . . $25,408!

MOST EXPENSIVE GRINDING WHEEL ever made by Norton Co, price tag $25,408, gets extra-special care in crating for shipment to American Lava Corp. The 20-in. dia, 6-in.-face wheel, coated with diamond to ⅛-in. depth, will be used for centerless grinding of ceramic parts to tolerances of 0.0001 in. Life of this wheel is estimated at three years, based on 24-hr-per-day, 5-day-a-week use

Diemakers Local Bolts IAM

". . . we feel our pay should increase faster than other machinists," dissenting local says . . . hopes to be nucleus for international tool and die union

OAKLAND, CALIF—Charging their wage scale has lagged behind that of other crafts because their wagon is hitched to that of less skilled machinists, leaders of Tool and Die Makers Union Local 1176 have split off from the International Association of Machinists.

The move preceded by a few days a decision by the National Labor Relations Board to permit craft groups within an industry to bolt the main bargaining unit.

Said Dale T Swingle, former business representative for the Tool and Die Makers, "We have been compelled to take across-the-board wage hikes for the past seven years (a 10¢ hike last year) and we feel our pay should increase faster than other machinists since we are the highest skilled."

He added, "the differential between our pay and the patternmakers' pay was 12 or 13 cents in 1950 and now is 41 cents." Swingle, one of the founders of the new union, said the tool and diemakers were forced to join IAM's Grand Lodge in 1947 or loose their charter.

An NLRB hearing on the new union's request for elections in two plants is slated for March 16-17. According to Mr Swingle, the new union has received 90% of its authorization cards from tool and die makers at Marchant Calculating Machine Co, Emeryville, and Friden Calculating Machine Co, San Leandro—but it is not asking them to join officially until an election is held.

The new union, which will headquarter in Oakland, has according to Swingle, been "besieged by inquiries from tool and die men in local shops." And, he says, although the union is now independent, it is "interested in an international organization."

On the other side of the fence, IAM representative John J King says members of Local 1176 have been the highest paid in the country for the last three years. The Bureau of Labor Statistics says the San Francisco-Oakland area's average hourly rate of $2.57 is highest in the country for non-job-shop affiliated diemakers.

And, he adds, tool and die makers are in the minority in the Oakland region, accounting for only 87 of the 884 IAM workers at Marchant, and 182 of 1590 IAM workers at Friden.

King also said Swingle and two other officers of the union have been suspended for dual unionism, and that Swingle would also be charged with misusing union property and failure to account for funds.

Dealers Ask Lower Freight Rates For Shipment of Used Machinery

Claim cost of transport is often higher than cost of machine — that excessive freight rates have cut cross-country shipments to "practically nothing"

CHICAGO — Representatives of the Machinery Dealers' National Association, meeting here with railway and trucking industry officials in January, claimed that excessive transportation costs are turning many used machine tools into "economic white elephants," whose shipping charges over long hauls are often more than they are worth.

Machinery dealer spokesmen based their petition on four factors:

- If used machinery being shipped for reconditioning were to be granted lower rates, the saving could be passed on to the ultimate user. And the railroads and truckers would benefit from the increased traffic in used machinery because each machine is shipped two ways — to the reconditioning plant and back — in contrast to a single shipment for new machinery.
- Some metalworking machines are now rated second class, others first class by the carriers, and in MDNA's opinion there is no reason for this.
- Weight of metalworking machinery is extremely high in relation to the area it occupies in a railroad car or truck, and its value-per-pound-hauled is low.
- Users of metalworking machines buy used equipment because it's cheaper. But both used and new machines are hauled at the same rates —to the extent that the cost of a used machine is boosted to the point where a small shop owner can't afford to buy it. This is particularly true in the case of shipments of used machines from the East and Midwest to the Pacific Coast, now diminished to practically nothing. Not only do these factors reduce general commerce, they cut carrier revenue.
- Reclassification of used machinery into lower freight-rate categories would result in wider machine distribution, increase the number of machines changing hands, and will help used machine sales grow.

Rates asked for by MDNA Executive Director R K Vinson would result in reductions of 10-22½% on LCL and LTL shipments, and about 10% for carloads and truckloads.

Gold Fringes?

Employee fringe benefits now cost Cleveland manufacturers an average of almost 31¢ a man hour, a survey of 160 companies shows. Up 6¢ since 1951, biggest fringe benefit increases are reported by companies employing under 100 workers.

Making 2-Ton Carbide Pieces in a 220-Ton Press

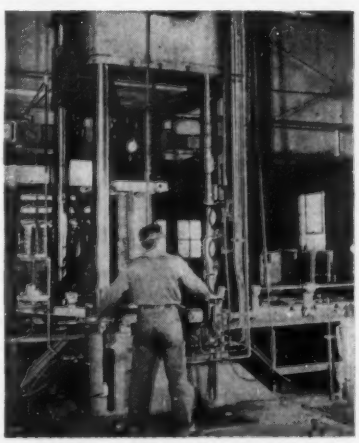
DETROIT — Single, solid pieces of cemented carbide weighing up to 4000 lb are now being produced on a 220-ton hot press installed here at General Electric Co's Carboloy Dept. The press produces parts for large die sections, steel strip rolls, punches for cold extrusions and other uses.

The 19-ft hydraulic unit compresses carbide pieces up to 21-in. dia x 21-in. high, or 7-in. dia x 5-ft high, with dimensions governed by weight; and only size of molds available prevents processing of larger pieces.

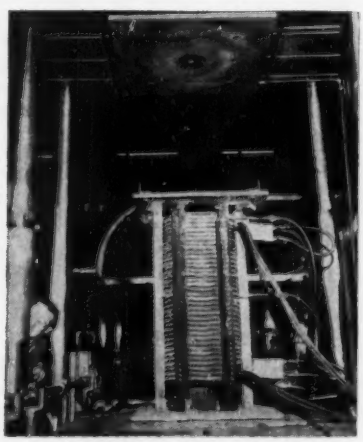
Work is brought under the press's ram by traversing table that doubles as a loading platform. Work during pressing phase is heated by a large furnace at temperatures of 1300-1500 C. Graphite mold is positioned on platform, premixed and preweighed powders are fed in by vibrating feeder.

When mold is filled and punches in position, heating furnace is lowered over mold. Meanwhile, a previously prepared mold is being pressed. When press is ready for the new mold, traversing table slides it into position, spots it under the press ram, heating furnace is hooked to power source and water connections, and press begins its cycle.

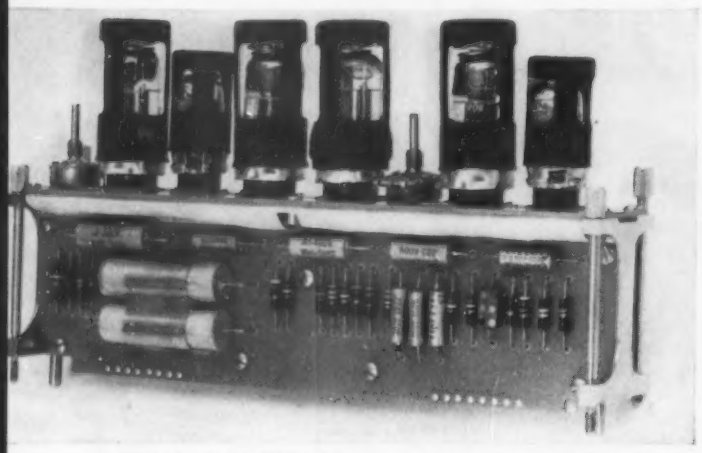
After the pressing cycle, work is shifted by traversing table to opposite side of the press, where the heating coil is removed and the mold picked up by overhead hoist and delivered to knockout room. Piece is cooled and sandblasted with silicon carbide.



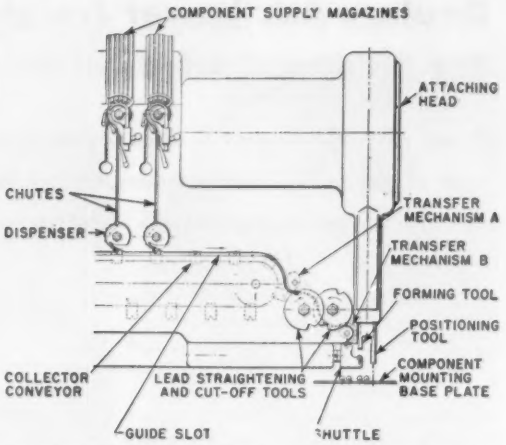
19-FT, 220-TON HOT PRESS at GE Carboloy produces solid cemented carbide pieces weighing up to 2 tons



SPOTTING FURNACE UNDER RAM on 220-ton hot press, said to cut hot pressing time 50% over old method



ASSEMBLY MACHINE triggers parts from magazines into assembly, crimps leads as required, feeds out complete unit



FIRST TRIAL ASSEMBLY uses special rack chassis, but all components showing are standard

Another Automation System for Electronics

Stanford University and the Air Force have come up with a counterpart to the Navy's "Project Tinkertoy" (AM Oct 12 '53, p208)—a design that allows automatic assembly of complex electronic assemblies. This one uses standard parts, more conventional layouts

PALO ALTO, CALIF—A symposium on automatic production of electronic equipment, scheduled for April 19-20 in San Francisco, will examine the latest in electronic design for high production. Stanford Research Institute developed the system for the Air Force, keeping in mind these six points:

- Production runs may be large or small.
- Changes in product design may be made.
- Machinery must be simple.
- Product must be dimensionally accurate.
- System should be compatible with other operations on product.
- Presently available and acepted components must be used.

The last point is the one where the SRI method differs most sharply from Tinkertoy, which includes specially made resistors, capacitors, and other components. An electronic package made on the above assumptions could be easily repaired in the field, using exact duplicates of the components available anywhere.

SRI investigated the printing and chemical fields, as well as electronics, to find equipment that could be adapted for making electronic assemblies, thus following the premise that an automatic manufacturing system should be economical as well as technically feasible.

Assembly Time Goal: 18 Sec

First product is a simple assembly, aimed to be put together by machine in 18 sec (evidently not yet attained). Another pilot assembly, which has components of different size and shape, will test flexibility of the system. The method includes printed circuitry, and SRI has already improved that technique somewhat by shifting to nitric acid as an etchant, cutting etching time from 3 min to 30 sec. Other areas for investigation:

- Applying wax flux to resist acid etch.
- Metal mask to form circuit pattern when acid resistant is sprayed.
- Magnetic chuck to hold metal mask.
- Finding best etch time vs etchant regeneration, copper recovery to form continuous etching operation.
- Production etching machine.
- Simplified assembly machine.

Automatic electronic assembly, in addition to reducing time and materials required, has other advantages. It reduces labor requirements, increases availability of electronic parts, helps quality control, and increases capacity of any production space.

SRI system may clash with Tinkertoy in some areas, but it is a simpler basic design (although the equipment may not necessarily be simpler). By using standard components (as used in any radio or TV set) it might well be more generally adopted as a less violent design advance, leaving Tinkertoy for the extreme cases where space is a vital factor.

NATIONAL ACME TO SELL ENGLAND'S BSA AUTOMATICS

CLEVELAND — National Acme Co of this city, manufacturers of Acme-Gridley multiple and single spindle bar and chucking automatics, has been named exclusive US sales representative for English-built BSA single-spindle automatic screw machines—completing National Acme's line of single and multiple spindle automatics for all classes of bar machine work.

Under terms of the agreement, National Acme will handle the complete line of BSA models, built in five sizes from ½-in. to 2-in. rated capacity by BSA Tools, Ltd.

Carl J Demrick

W B Duncan

John F Romans

Names in the News

Carl J Demrick has been elected vice president in charge of manufacturing of Plymouth Motor Corp; he moves up from his post as general manufacturing manager. Mr Demrick joined Chrysler in 1934; during World War II he served as foreman of the Bofors gun project, heat treat engineer in the staff master mechanic's department, and as a tool engineer. In 1948 he was appointed master mechanic of the Lynch Road plant, and in 1951 became supervisor of the central estimating department. He was made staff master mechanic of the corporation in January 1953, and three months later was named general manufacturing manager.

Duncan W Fraser has retired as chairman of the board of American Locomotive Co; the office will be discontinued following the retirement, effective April 27. Mr Fraser has been associated with the company since 1901. He was elected a director in 1924, a member of the executive committee in 1939, and president the following year. He became chairman in 1945, and in early 1950 took on the office of president, a post he held until Dec 1952.

Ray Powers, vice president of manufacturing, Packard Motor Car Co, is directing the manufacturing transfer of the company's engine, automatic transmission, and axle manufacturing facilities from Detroit to its Utica, Mich, plant *(see page 183)*. Mr Powers came to Packard six months ago from Lincoln-Mercury Div, where he directed L-M's move from its Detroit plant to the present site in Wayne, Mich.

W B Duncan has been appointed chairman of the board of the Wesson Co, Detroit manufacturer of carbide cutting tools. **E Mortensen,** vice president in charge of manufacturing, succeeds him as president of the firm. Mr Duncan, who has headed the company since 1941, takes over the post held by the late **Frank W Archer, Jr.** Prior to joining Wesson as president in 1941, Mr Duncan was associated with Chicago Latrobe Twist Drill Co, as assistant to the president.

William L Smith has been appointed general manager of Fairchild Engine & Airplane Corp's Speed Control Div of Wickliffe, Ohio. The division is presently engaged in development and production of devices for automatic production controlled with infinite speed ranges. Prior to the appointment, Mr Smith served as assistant director of the Industry Planning Service of the Aircraft Industries Association, Washington, DC.

Paul M Clark has been elected a vice president of Studebaker Corp; he will continue to act as secretary of the company. Mr Clark, who joined Studebaker in 1944 as assistant to the board chairman, will be in charge of industrial relations for all plants.

Daniel S de Rimini has been named general sales manager of Anton Smit & Co, New York manufacturers of diamond tools, wheels, and drill bits. **Frans Ls Meyjes** has been appointed vice president in charge of production, and **Oscar A Tellier,** treasurer.

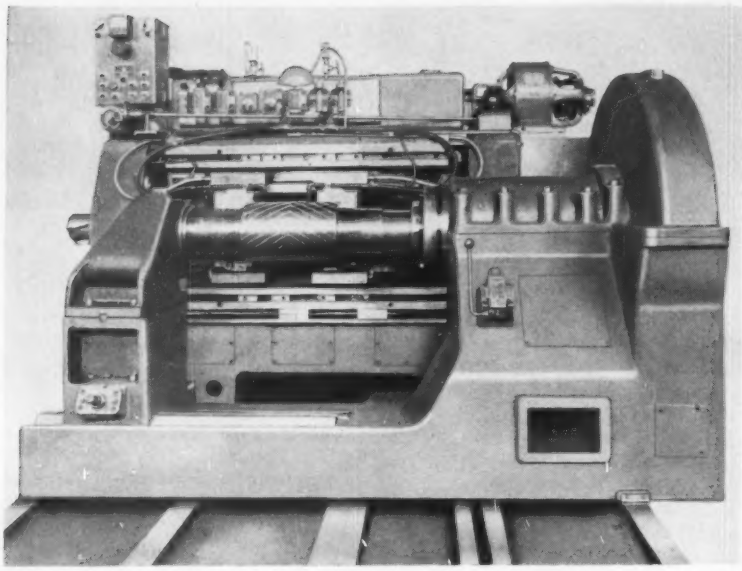
John F Romans has been appointed to the central staff of the Eaton Manufacturing Co, Cleveland. His initial assignment includes inspection of all capital equipment, methods, and processing of the fifteen plants in Ohio, Michigan, Wisconsin, and Ontario, Canada. Prior to his appointment, Mr Romans served for seven years as director of engineering and manufacturing at Motch & Merryweather Machinery Co, Cleveland manufacturers of specialized machine tools.

Prentice Borden has been named vice president and works manager of Lewis-Shepard Products, Watertown, Mass. He joined the company on Jan 1, and is managing the engineering, purchasing, and manufacturing operations at Watertown and Crawfordsville, Ind. He was formerly associated with the Crescent Truck Co of Lebanon, Pa, which he joined in 1950 as general manager; he was made president of the firm the following year. **George C Shephard** has been promoted to assistant works manager; former Production Manager **Herbert W Merrow** has been named general superintendent. **Robert L Buckley,** supervisor of standards and methods, takes over Mr Merrow's post.

OBITUARIES

Frank E Moore, 76, chairman of the board of the Mathews Conveyor Co, Ellwood City, Pa, died Feb 6. Mr Moore joined the Mathews Gravity Carrier Co in St Paul, Minn, shortly after the company was founded in 1905, and brought the company, now Mathews Conveyor, to Ellwood City in 1912, where he served as president until 1948 when he became board chairman.

New Shop Equipment



Farrel-Sykes Gear Generator Redesigned for Higher Speeds

The Farrel-Sykes gear generator has been redesigned to provide finer precision at higher operating speeds. The new machine, known as the Twin-Head gear generator, is said to cut gears up to 33 1/3% faster with higher accuracy and quality of tooth finish. Greater operating convenience has been built into the machine, including rapid selection of speeds and feeds, easy adjustment of cutters, positive control of infeed or depth of cut.

More important design changes include; heat-treated main spindle and heavier work saddle to provide more rigid support; full hydraulic control system; electronic speed and feed indicator to enable operator to read and quickly adjust rpm of main crank, fpm traverse of cutters, and feed; twin cutter heads with separate, shorter, and stiffer spindles to produce gears with more accurate involute roll, helical trace and tooth spacing as well as better tooth contour surface finish; cutters extending forward so that small diameter pinions and pinions with long shaft extensions can more readily be cut.

The rotary feed of cutters and work is controlled by a separate hydraulic fluid motor through a double reduction gear to the cutter index wheel and main dividing wheel. This arrangement eliminates the four-speed gear box formerly used and provides infinite variation in the number of strokes per revolution of cutters. Since the generating feed mechanism is independent of the speed of the reciprocating carriage, greater flexibility of feed is obtained. The number of strokes is adjusted by a flow control valve and indicated by an electric meter.

The twin-head generator is available in four models with maximum diameters of gear handled of 37, 61, 100 and 120 inches and pitch diameters of 3, 2, 1¼, and 1¼ in. (helical), and 2½, 1½, 1¼, 1⅛ in. (straight tooth).

In addition to continuous-tooth herringbone gears, the machine will cut double helical gears with wide or narrow center groove, single helical, and straight tooth gears. It can also produce cluster gears, angle gears, spiral gears, worms, racks (with special fixture) and a variety of special contours.

Farrel-Birmingham Co, Inc, Ansonia, Conn

Stepless Current Control By GE Rectifier Welder

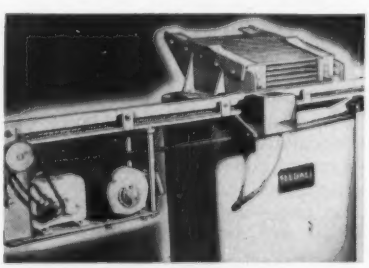
GE 400-amp, 3-phase, dc rectifier-type welder with 60% duty cycle can be equipped to operate on 2-phase power and has current welding range of 70 to 500 amps. Selenium rectifier allows easy current adjustment by means of stepless current control. Other features stated by GE include quiet operation and simplified maintenance.

Instant arc welding is assured and because of the high current produced by the six parallel-path selenium rectifiers, stable arcs and smoother welds are possible. Class H insulation gives extra protection against high temperature and is moisture, fume, and chemical resistant.

To further protect the coils and cool the rectifier stacks, a reversible 14-in. forced-draft fan provides ventilation. Cooling system operates on an up-draft principle, preventing the recirculation of exhausted hot air.

Unit is 35x36x47 in. and weighs 660. It is available with full-time arc force control which minimizes pop-outs and freezing-in.

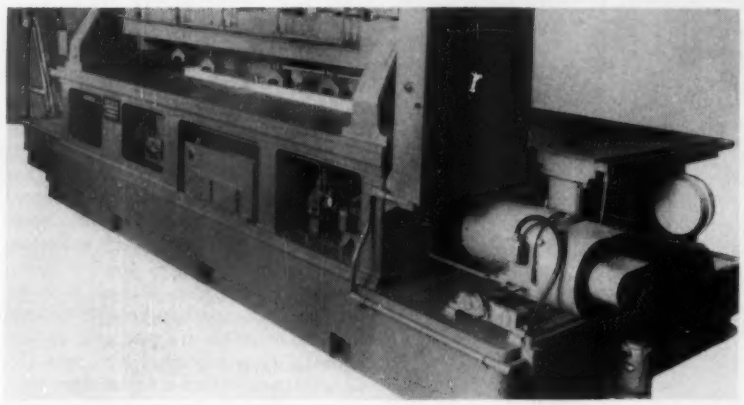
General Electric, Schenectady 5, NY



AUTOMATIC MAGAZINE LOADER feeds long cylindrical work to centerless grinders, special polishing, or inspection machines. Magazine is loaded with parts which are automatically delivered to built-in conveyor. Parts are cycled by means of photoelectric relay mounted on conveyor attached to front of machine. Feeding rate is controlled by variable speed drive. Entire unit is self-contained, mounted on fabricated steel base housing electric and air controls. This model is designed for a range of work from ⅝ to 1½ in.-dia and 10 to 24-in. length. Other models are available—

Feedall Machine and Engineering Co, 38399 Pelton Rd, Willoughby, Ohio

Materials and Parts



High-Speed Plate Saw Raises Stock Hydraulically

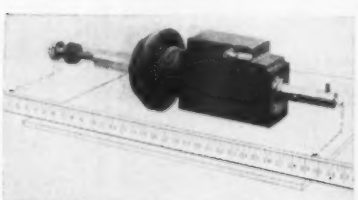
Motch & Merryweather high-speed plate saw handles aluminum plates up to 4 in. thick x 12 ft long. Coolant sump, chip compartment, and chip conveyor are built into the base. The hydraulic tank and pump with motor are in centrally located recess.

The surface of the plate is equipped with free rollers in small cylinders actuated hydraulically to raise the stock from the surface of the table. This enables positioning the stock more easily. Rollers are provided in two directions, each under control of operator.

The stock is clamped by a heavy rail with direct-acting hydraulic cylinder hold-down clamps. These clamping units can be positioned along the rail, depending upon length of stock. Each clamp has shut-off valve to make it inoperative if not needed.

Single-speed saw head is mounted on dovetail slide beneath table. Variable feed rate of head is provided by a vari-drive at right-hand end of table through feed screw and nut arrangement. Automatic cable take-up reel supports power cable to motor on saw head carriage. Adjustable fence squares up the stock.

The Motch & Merryweather Machinery Co, Penton Bldg, Cleveland 13, Ohio



Precision Boring Machine Mounts on Jigs or Fixtures

Precision Hydro-Borer, Model S-6, was designed for close-tolerance boring, yet is compact enough for mounting on work-holding fixtures or assembly jigs. Overall measurements of the unit are 29½ in. long by 6¾ in. high by 5¼ in. wide. The main housing measures 9 3/16 in. long, 3¾ in. wide. The weight is 70 lb.

Bore-diameter range is from ⅜ in. to 6½ in. with a travel length of 6 in. Because the taper in the spindle is eccentric, bore diameter can be increased 0.014 in. in increments of 0.001 in. without resetting the tool. Feed is 0.004 in. and can be reduced to 0.002 in. The model is available for right- or left-hand mounting with a minimum center-to-center distance of 4¾ in.

Spindle is fed into the work on a patented principle known as "positive feed through oil displacement." Tolerances of ±0.0003 in. and finishes to 20 mu-in. are reportedly achieved. Price of the basic unit is $600.

The Hydro-Borer Co, 1601 E Olympic Blvd, Los Angeles 21, Calif.

... INCLUDING

Variable-speed drilling and tapping machines have from one to eight spindles ..... page 190

Precision surface grinder was designed for gage and form tool work as well as conventional surface grinding ..... page 191

Opposed-spindle drilling machine is hydraulically controlled to afford multiple-hole drilling on medium and large parts .. page 192

Squaring shears are available in two models with blade lengths of 52 and 16 inches ..... page 196

Automatic stamping press has adjustable speed drive which permits clutching at low speed and building to high at adjustable rate ..... page 198

Squaring shear line includes eight power-driven, six foot-operated, and four air-powered models page 200

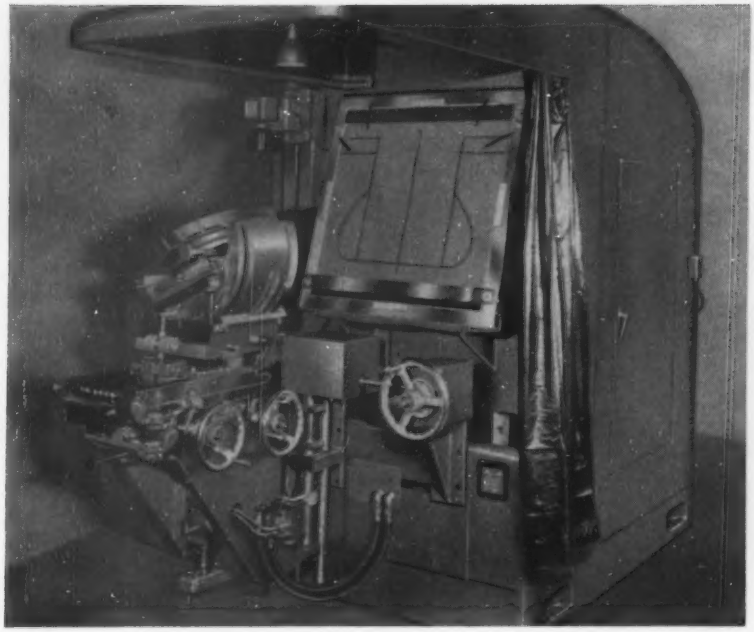
Precision punch press, open-back inclinable type, is rated at 1½ tons for continuous duty .... page 204

Hardness tester for both ferrous and non-ferrous sheet metal page 206

... and in Mar 29

Lathe roll-forms hollow conical and cylindrical parts from flat disks, blanks premachined from bar stock, forgings, or centrifugal castings.

Two-dimensional pantograph engraver handles steel, cast iron, non-ferrous materials, and plastics.



Gas Turbine Disk Slots Inspected by Optical Comparator

Jones & Lamson optical comparator will inspect slot contour, angular locations, and spacing on gas turbine disks from 12 to 36 in. in dia. The receiving screen is located at one side of the workholding fixture and positioned vertically at eye level. All controls are within easy reach of the operator. Vertical travel of the worktable is hydraulically operated with a Servomechanism giving finger tip control. The 30x30-in. receiving screen permits use of projection lenses of suitable area to encompass most slots at magnifications of 31.25 or 50 times.

The staging fixture with suitable sine bar arrangement is rigidly constructed for supporting heavy disks. It provides accurate means for tilting disk up to 50 deg either right or left for slot angle, and up to 15 deg for face angle of slot to axis of disk. Slot-spacing measurement is accomplished with a graduated ring and vernier. Any inaccuracies in slot spacing are indicated by relationship of shadow of slot to chart outline.

Jones & Lamson Machine Co, 160 Clinton St, Springfield, Vt

Edlund Variable-Speed Drilling and Tapping Machine

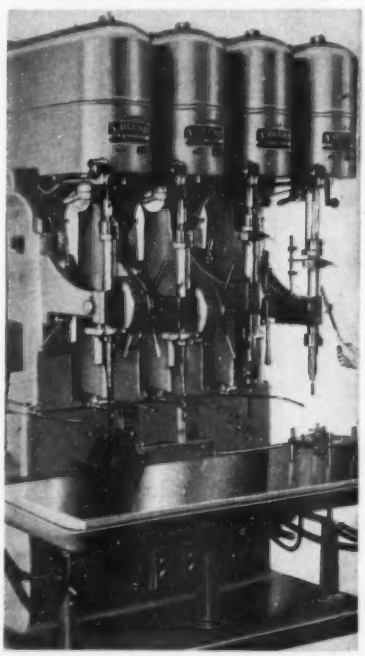
Edlund Model 2F variable speed drilling and tapping machine allows the operator to select correct speeds instantly with no lost time for changing gears or belts. Speed changes are made instantly with a handle-controlled mechanism conveniently located. An indicating dial shows the speed selected.

Spindle speeds range from 200 to 3600 rpm with a low range of 200 to 1200 rpm and a high of 600 to 3600 rpm. Three intermediate speed ranges are standard and, with the back gear attachment, additional ranges of speeds from 50 to 900 rpm are obtained. Capacity of machine with back gears is ⅞ in. for steel, 1¼ in. for cast iron. Models with 8-in. and 15-in. overhang and from one to eight spindles are available in the pedestal-type machine; 8-in. and 15-in. overhang round-column-type machines are included in the line.

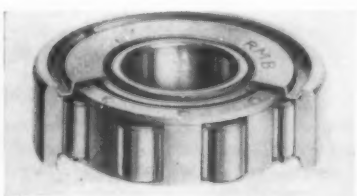
Additional Edlund equipment includes: semi-automatic power feed; reversing-motor tapper capable of tapping 30 holes per minute and reversing at same depth within ¼ turn; Edlund lead screw tapper with adjustable stops and interchangeable pick off gears; work lights; and gusher coolant system.

Additional information is contained in manufacturer's Bulletin No. 140.

Edlund Machinery Co, Cortland, NY



Edlund drilling and tapping machines are available in the pedestal-type with from one to eight spindles



Miniature Roller Bearings In Various Types and Sizes

Miniature roller bearings are available in three types and seven sizes from 0.4724 to 1.0236-in. OD from Landis & Gyr. All types are reported suitable for use in machines and motors where shafts are subjected to heavy radial loads. All types permit axial displacement of the shaft.

The roller assembly is retained by a snap ring on the inner face in a section of the shield at the outer race, a method of construction eliminating the necessity of a lip on either race way. An example of the precision construction is the fact that the tiny studs which hold the bronze roller cage together are hollow milled.

Type N permits free axial displacement of the shaft and removal of the shaft inner race and roller cage as a unit. Type NU is constructed so that the inner race remains on the shaft and the outer race, rollers, and roller cage may be removed as a unit. Type NP, illustrated, has permanently assembled outer and inner races.

Landis & Gyr, Inc, 45 West 45th St, New York 36, NY

Offset Forming With Special Machine

Developed specifically for the aircraft industry, the joggler machine is said to form uniform, dimensionally-accurate joggles at low cost. It is actually a combination of two angle blocks, one of which remains stationary while the other is free to move in any degree parallel to the stationary block. A set of vise jaws is mounted on each angle block and the part to be joggled is clamped between the angle blocks by the vise jaws. The joggle is then formed automatically by pushbutton control. The depth of the joggle and the direction of forming are preset by adjusting a knob and setting a visual indicator. The vise blocks constitute all the tooling required; these blocks may be machined from customary tooling materials or cast from Cerrotru. Their shape is the contour of the part.

Also being developed by the same manufacturer is equipment for hot joggling. Automatic control will be a feature of this equipment.

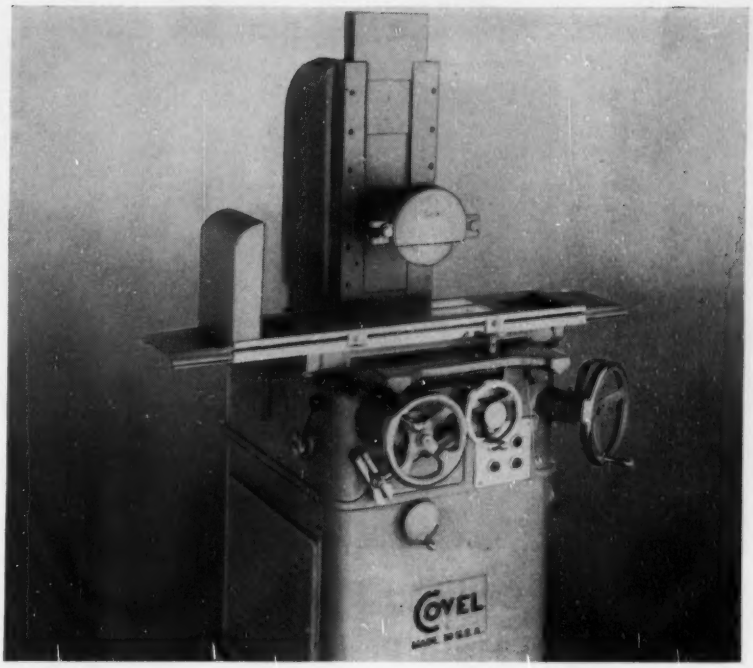
Intercontinental Mfg Co, Inc, Garland, Texas

Horizontal Platen Grinder Uses Rubber Contact Belt

Curtis horizontal platen grinder, which has both platen and contact roll, is equipped with a serrated rubber contact belt and claimed to be the fastest-cutting platen grinder.

The grinder, designated Model KGB 310, with its contact belt running between the platen and the abrasive belt, now provides flat grinding with efficient cutting action. The rubber serrated contact belt reportedly minimizes glazing or loading of the abrasive belt with its high-speed-impact action. The unit features a two-speed motor which develops belt speeds of 5,000 and 12,000 sfpm.

Curtis Machine Corp, 1300 E Second St, Jamestown, NY



Surface, Gage, Form Tool Grinding With Covel Machine

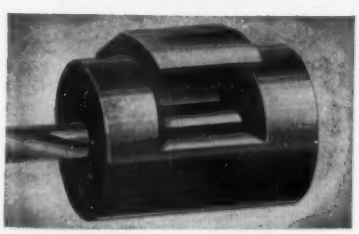
Precision surface grinder, designed for gage and form tool work, as well as surface grinding, has reciprocating table available with hand or mechanical feed. Its longitudinal table travel is 20 in., transverse table travel, 7 in. Vertical travel of the grinding wheel is 15 in. It will grind work 6x18x15 in. under a 7-in. wheel powered by an 1-hp motor-driven spindle. Table speed ranges from 15 to 50 fpm.

The 6x18-in. table (working face) is provided with a ½-in. wide T-slot. Automatic adjustable crossfeed, hydraulically powered, ranges from 0.002 to 0.050 in.

For such close work as gage grinding, the elevating and transverse movements can be equipped with indicator gages to be used with gage blocks or measuring rods. An additional standard feature is the special timing belt which eliminates the use of a rack on both hand and power feed models. The power feed model has the hand feed interlocked with the electric circuit so both hand and power feed cannot be engaged at the same time.

Attachments available include hard chrome table ways, wet attachment, magnetic chuck, dust collector, and Bijur lubricating system. Additional information is contained in manufacturer's bulletin No. 10-54.

Covel Manufacturing Co, Benton Harbor, Mich



Barnaby Tool Holder Bushing Eliminates Retaining Rings

Toolholder bushing completely eliminating retaining rings and spring clips is reported to facilitate setups on B&S automatics and similar machines. The bushings prevent shoe loss or the possibility of using the wrong shoe in the bushing. When clamped, bushing halves will not slip; the clamping shoe is permanently fastened to the bushing body with a hinged pin. The shoe floats freely on the pin.

Bushings can be used in all drill holders, tap holders, knurl holders and floating holders. They are furnished in sizes from ½ in. to 1¼ in. in dia and 13/16 to 1 9/16 in. long.

Barnaby Mfg Co Inc, 74 Knowlton St, Bridgeport 3, Conn

Walter Hill Drilling Machine For Multiple Hole Production

Semi-automatic hydraulically-controlled machine tool was designed to speed drilling operations on medium and large size metal parts in small lot and semi-mass-production quantities.

Termed the Opposed Spindle Drill, the new machine reportedly combines speed of two-way drilling machine with flexibility of radial drill and accuracy of horizontal boring machine.

The machine consists of two fabricated steel vertical structures, each supporting two columns and mounted opposite one another on a welded steel base. The machine table is traversed on ground steel ways on base between structures. Motorized power heads having integral hydraulic feeds are mounted on each vertical structure. These units can feed individual drills or drillheads at varying speeds into opposite sides of the work at different levels. Power heads are positioned vertically by twin hydraulic cylinders guided on two ground round columns. Heads are designed to resist 23,000-lb. unbalanced thrust loads. Machine table is fed between spindles by a single hydraulic cylinder.

The machine illustrated is drilling 1200 ¾-in.-dia. holes in a 5-ft-dia, 4-in.-thick forged-steel condenser tube. After mounting the sheet on the fixture, power heads are positioned to individual locations corresponding to the horizontal centerline of a row of holes. The heads are locked in position and the table is next positioned through index plate so that the heads will drill the outside hole in their respective row. Automatic drilling cycle is initiated by single pushbutton control. The table is then indexed to the next hole position for another cycle. Upon completion of a row, heads are repositioned vertically to new hole rows and table is indexed in reverse direction.

The machines are made in a variety of sizes and models. The condenser-tube-sheet drilling machine illustrated has a floor space of 15x9x10 ft. Power is supplied by a Hill No. 2 pack having 5-hp motor and 12-gpm pump. The power heads are V-belt driven by 10-hp motors. A 4-in.-dia hydraulic cylinder positions the table.

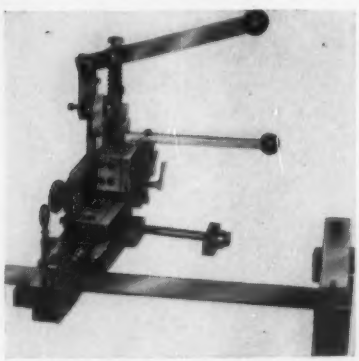
Walter P. Hill, Inc, 22183 Telegraph Rd, Detroit 19, Mich

Gaging to One-Half Millionths With Cleveland Microcomparator

Dimensional gaging in increments of one-half millionth of an inch is provided by the Cleveland Instrument Co Micro-Ac electronic microcomparator. The instrument consists of an induction-type gage head mounted on a rigid stand and a drift-free industrial-type amplifier with meter. The meter has two continuous linear scales which read 0.0000005 and 0.000001 in. per division either side of center zero. Respective measurement ranges are 0.000010 and 0.000020 in. Other ranges can be provided for the less-sensitive scale.

The two scales can be used interchangeably at will, selected by a knob on the panel. Repeat readings are reported consistently obtained within one-quarter millionth of an inch. The instrument can be used anywhere the temperature is fairly constant.

Cleveland Instrument Co, 735 Carnegie Ave, Cleveland 15, Ohio



Turn-Mat Machines And Lathe Attachments

Karge profile-tracer Turn-Mat machines and lathe attachments are reported to solve production problems involved in turning long and slender parts, with multiple diameters and forms, to close diameters and run-out tolerances with fine surface finishes. Bar stock, round, square, and hexagon from 1/32 to 3½ in. in dia can be turned, formed, and sized to unlimited lengths, diameters, straight or taper to micro finish within tolerances of 0.0005 in. The self-aligned spindle rotates in high-precision ball bearings, and the bar stock is held by spring collet and adjustable to correct tension to permit the Turn-Mat to slide over the stock and, at the same time, rotate the spindle at the same speed as the lathe spindle.

Alterations to the lathe are not necessary. One tie bolt through the compound rest slot fastens the Turn-Mat and aligns and centers cutting tools. The accuracy of the lathe spindle is of no importance because the precision is built into the unit itself.

Turnomat Co, Inc, Brockport, NY

GIDDINGS & LEWIS
KEARNEY & TRECKER
MICROMATIC HONE
LEES-BRADNER
FELLOWS
CROSS
LE BLOND

ALLEN-BRADLEY CONTROL PANEL
ALLEN-BRADLEY CONTROL PANEL
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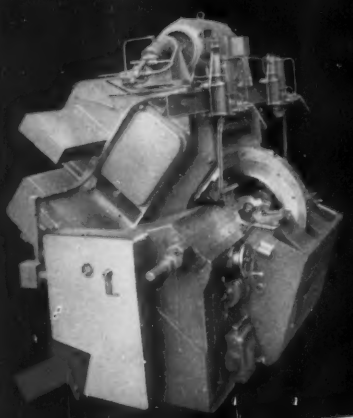
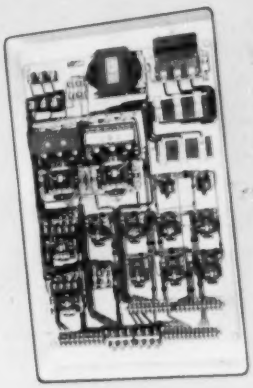
ALLEN-BRADLEY CONTROL PANEL



This LeBlond lathe has an Allen-Bradley control panel in cabinet at end of lathe. There are 20 components of which 14 are Allen-Bradley relays, contactors, and starters.

Allen-Bradley solenoid controls have ONLY ONE MOVING PART. No pins, pivots, or bearings to rust and stick. They are good for millions of trouble-free operations. That's why A-B controls are a sales asset to any machine tool.

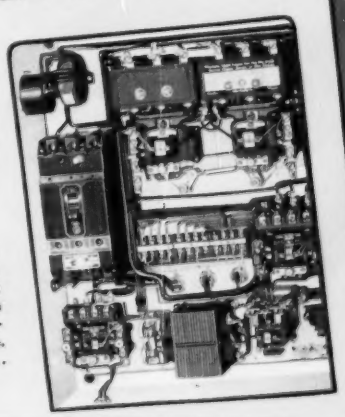


GORTON

ALLEN-BRADLEY CONTROL PANEL

This Gorton milling machine has an Allen-Bradley sequence control panel in the machine frame with 6 A-B solenoid-operated relays and starters, all equipped with silver alloy contacts that require no maintenance.

The ITE circuit breaker is interlocked with the door handle, which must be in OFF position to open cabinet. This is an important safety feature. Specify Allen-Bradley... and be safe.



TROUBLE-FREE CONTROL PANELS

FOR ALL TYPES OF MACHINE TOOLS

Today . . . more and more machines are being "factory-equipped" with Allen-Bradley control panels. Why? Because Allen-Bradley solenoid relays and contactors are so simple . . . ONLY ONE MOVING PART . . . they assure maintenance-free service for years.

ENGINEERED TO FIT YOUR NEEDS

Machine tool panels, designed and built by Allen-Bradley, provide dependable, automatic sequence control of machining operations . . . with split-second accuracy. Allen-Bradley control panels are all tailor-made to get the greatest output from machine tools of every type. Your near-by Allen-Bradley sales engineer will gladly discuss your control requirements.

Send for Bulletin
ALLEN-BRADLEY CO.
1316 S. Second St., Milwaukee 4, Wis.

3-54-R

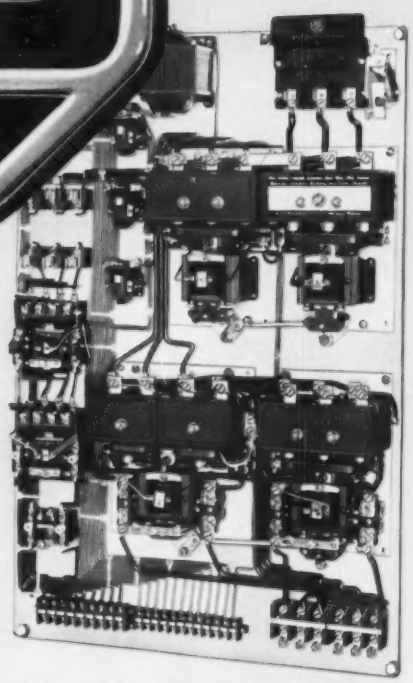
ALLEN-BRADLEY

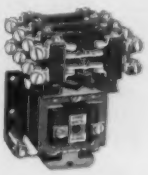
MOTOR CONTROL

A-B Quality

QUALITY COMPONENTS

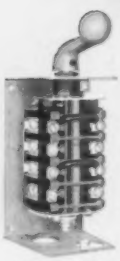
FOR MACHINE TOOL CONTROL PANELS





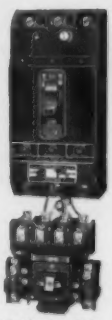
Bulletin 700
Universal
A-C Relays

Bulletin 200
D-C Relays

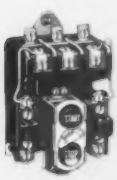


Bulletin 350
Drum Switch

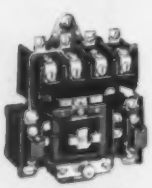
Bulletin 600
Small Motor
Starter



Bulletin 713
Starter and
Cir. Breaker

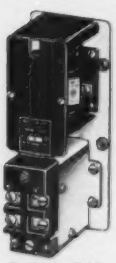


Bulletin 609
Manual Starter



Bulletin 709 Auto-
matic Motor Starter

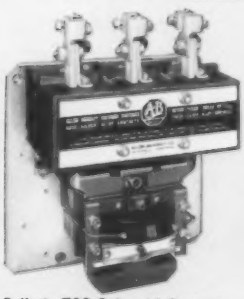
Bulletin 712
Starter and
Disc. Switch



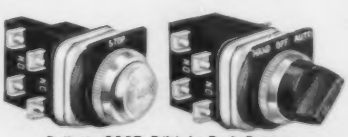
Bulletin 849
Pneumatic
Timer

All components of Allen-Bradley control panels, like relays, contactors, starters, timers, fuse clips, or terminal strips, are long-established units in the A-B line. But while they have been field-tested in thousands of applications, they still are continuously tested during manufacture. That's how A-B control maintains its reputation for Quality. Specify Allen-Bradley.

Allen-Bradley Co., 1316 S. Second St.
Milwaukee 4, Wisconsin



Bulletin 702 Solenoid Contactor



Bulletin 800T Oiltight Push Buttons

Bulletin 891 Fuse Clips

Bulletin 802T
Limit Switch

Bulletin 895
Auxiliary
Contacts

Bulletin 892 Terminal Blocks

ALLEN-BRADLEY

QUALITY

TROUBLE-FREE MOTOR CONTROLS

3-54-R

OSBORN

Here's better quality at lower cost . . . New Osborn Brushamatic No. 4 Machine. Handles metallic and non-metallic parts up to 100 pounds. Here, it is set up to deburr and blend teeth of sprocket.

Choose your weapons!

HOW are *you* going to answer the challenge of competition when it comes to your deburring and finishing operations? By hand? Or, by machine . . . with the Osborn Brushamatic? You'll far outclass the old manual deburring department in *quality* of work and in *economy* when you convert to Osborn's automatic power brushing.

At the push of a button, Brushamatic machines remove burrs and feather edges, blend surface junctures and clean parts thoroughly. Results are absolutely uniform . . . piece after piece. Scrap loss is nil. Service life of part is increased through elimination of stress-concentrating scratches. And it turns out work about *5 times as fast* as hand methods.

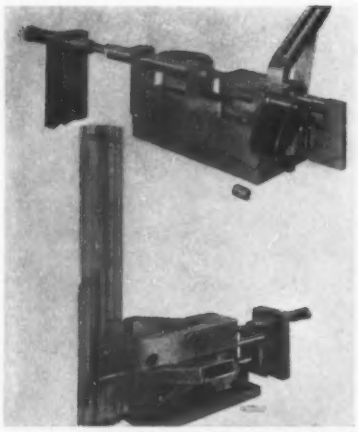
Find out how *you* can apply this modern method to *your* production. Call your nearby Osborn Brushing Analyst or write *The Osborn Manufacturing Company, Dept. C-16, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

INFORMATION:
Write today for your copies of booklets on Automatic Deburring and on Brushamatic Machines.

SEE IT AT OSBORN BOOTH 627, ASTE SHOW.

Osborn Brushamatic

BETTER QUALITY...LOWER COSTS...AT THE PUSH OF A BUTTON



Automatic Loaders Speed Output of Dual Ram Broaching Machines

National Broach announces a new line of Red Ring automatic loaders designed to speed output of externally broached round parts on conventional dual ram vertical broaching machines. The loaders are made in a wide variety of types to accommodate specific parts, feature magazine feeds and simple feed, clamp, and eject mechanisms. No auxiliary power source is required to actuate the loader mechanisms since the in-and-out travel of the dual ram broaching machine tables is utilized to impart motion to the loader feed and clamp components. Output of the loaders is limited only by the speed of the machine. Finished parts are automatically ejected.

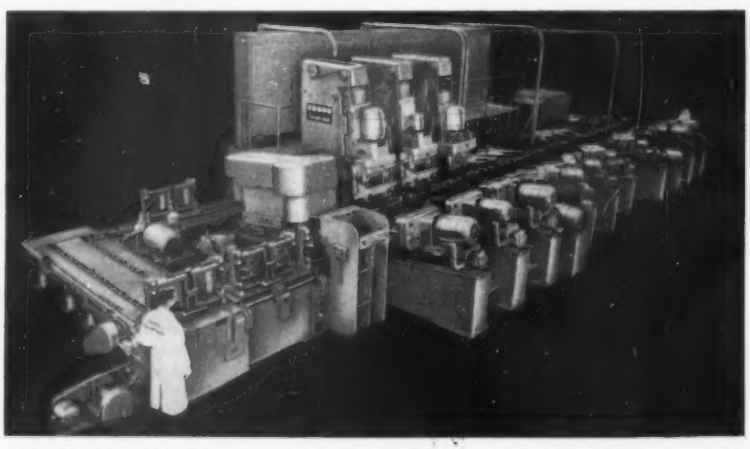
The loaders consist of a fabricated steel base which supports the magazine feed chute, feed and clamping mechanism, and unloading chute. The unit is mounted on one of the dual ram machine tables. A plate that actuates the loader through control rods is bolted to the front of the broaching machine base.

Surface broaches are mounted on a broach holder, keyed and bolted to one of the machine rams. This design permits the broaches to be mounted perpendicularly to the ram surface, enabling the parts to be fed and ejected at the side of the machine.

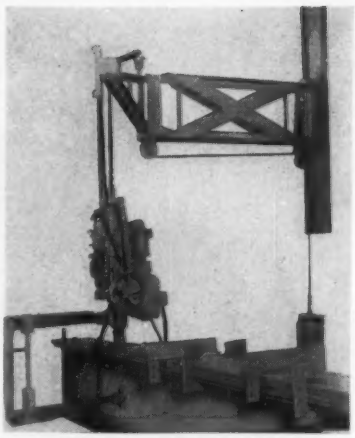
The upper loader in the picture broaches flats in three grooves in a 1.300-in.-length, 1.0-in.-dia hydraulic valve sleeve. With this type an automatic loader can be mounted on each machine table and a part produced with each ram stroke. It is also possible to mount loaders handling different parts on each table and broach two different parts on alternate ram strokes on a single broaching machine.

The loader shown at the bottom of the illustration unloads a part at the same time it is loaded. It includes a split plunger-type chuck that retracts the part to a position in front of the loading chute behind the magazine feed. The design includes an auxiliary roller wedge-clamping mechanism Loaders illustrated are about 10 in. high by 20 in. long.

National Broach & Machine Co, 5600 St Jean Ave, Detroit 13, Mich



INTAKE MANIFOLDS are machined two at a time on this Transfer-matic which performs 100 operations with a production rate of 206 parts per hour. The machine has fourteen stations, twelve for working, one for loading, and one for unloading. Features include: palletized workholding fixtures with power wrenches for automatic clamping and an integral conveyor for automatic return of palletized fixtures from unloading to loading stations. In addition, the machine has automatic chip removal, hardened and ground ways, automatic lubrication system, and electrical and hydraulic construction conforming to JIC standards — *The Cross Company, Detroit 7, Mich*



Portable, Automatic Unit Drills Large Steel Beams and Girders

Portable drilling machine which can work from any position around large, unwieldy steel beams, girders, and weldments, is operated by push-button and automatically drills holes up to 2 in. in dia at right angles to work surfaces.

Suspended from a crane or other overhead structure, unit is counterbalanced for quick, easy movement over and around workpieces too bulky for handling on conventional equipment. Drill penetrates steel on a line perpendicular to surface or surface tangent.

Operator moves drill head over a punch mark in the steel surface and locates drill point by means of a handwheel. Upon pressing a button, head automatically clamps to the structure, and drilling starts; upon completion, withdrawal is automatic. Cradle-mounted head can be moved from vertical to horizontal drilling and returned to vertical with minimum effort. Quick clamp adjustment makes it adaptable to materials of varying thickness; no leveling of workpiece is necessary. Operation is vibrationless, so that max drilling speeds and feeds are obtainable.

Max drill dia: 2 in.; drill rpm: 175 to 500; feed per rev: 0.005 to 0.020 in.

Artos Engineering Co, 2757 S 28th St, Milwaukee 46, Wis

Wil-Numat air collet closer is said to convert low-cost grinders into flexible, more universal units, adapts them quickly for 5C collets or their equivalent. Unit has been developed to give positive control over collet runout to insure maximum concentric efficiency that grinder is maintaining; concentricities of less than 0.001 in. are reportedly obtainable.

Wil-Numat Corp, 3713 S Robertson Blvd, Culver City, Calif

REVERE METALS

SERVE

Chris-Craft

STEM TO STERN

Bending a Revere Copper Tube for use in a Chris-Craft Cruiser. Revere Tube is also used in many Chris-Craft runabouts and utilities

Chris-Craft cruisers are protected at the stem by brass stem bands; Revere supplies half-round extruded shapes for this decorative and protective application. At the stern or transom, copper exhaust tubes are just visible. There is a story behind these tubes, which have to be bent to shape with great accuracy, and without wrinkling. Chris-Craft Corporation's specifications are most exacting. The bending is done by a specialist, the Melville-Lee Co., located in Algonac, Mich., as is Chris-Craft. When Revere sought an order for the copper tube, the Technical Advisory Service was permitted to study Melville-Lee's equipment and methods, so our Methods Department at the mill could be thoroughly informed of the high quality requirements.

The tube required runs in sizes from 2" to 3½" OD. Use of copper tube reduces weight, while the corrosion-resisting qualities of copper make it durable and long lasting. Special standards of control over roundness, eccentricity and temper were set up in our mill, and production shipments have worked perfectly from the very beginning. No wrinkling or tearing has been encountered.

• • •

Revere Metals not only serve afloat, but in the air, under the sea, and on land, in almost every industry, including such diverse ones as the chemical, automotive, electrical and electronic, and in the home. Products include tube and pipe, rod and bar, sheet and plate, strip, extruded shapes, forgings, in copper and its alloys and aluminum alloys. Also Lockseam Tube electric welded steel tube. Get in touch with the nearest Sales Office.

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Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N.Y. —Sales Offices in Principal Cities, Distributors Everywhere

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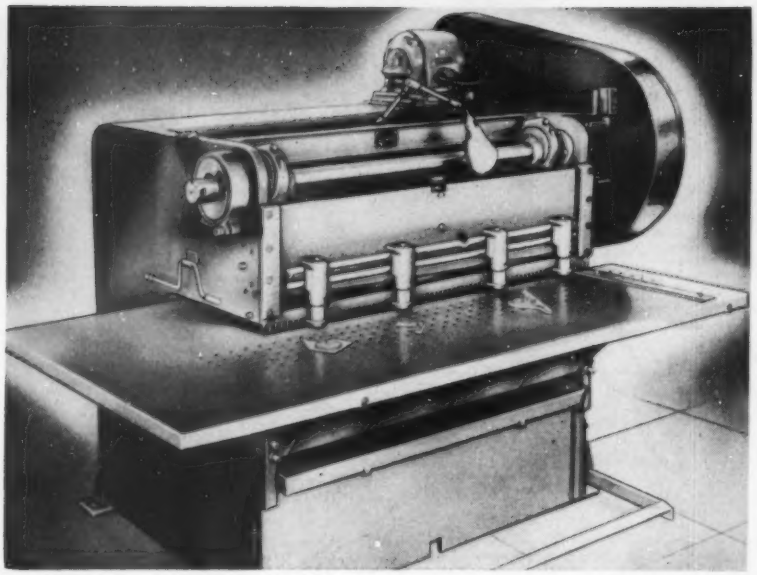


Manchester Squaring Shear Features Counter Thrust and Deep Throat

Manchester squaring shears, available in two models with 52-in. and 16-in. blade lengths, have throat depths of 24 and 7½ in., respectively. The larger machine will cut Duralumin, mild steel, and stainless steel in gages to ¼, ⅛, and 3/32 in., respectively. Smaller model cuts Duralumin, mild steel, and stainless in gages to ⅛, 3/32, and 1/16 in., respectively. Both machines operate at 120 strokes per min.

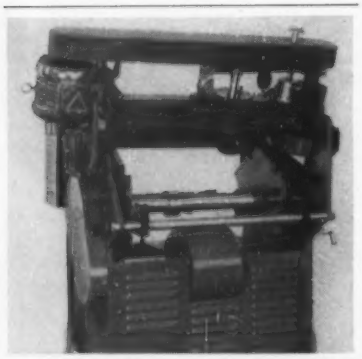
The slide assembly is a feature which counteracts the rearward thrust caused by the cutting action. Shaft is mounted to rear of slide, producing forward thrust behind upper blade. Plungers are provided with Micarta pads to insure firm grip and prevent marring highly polished sheets. Wide open throats permit use of end of blade for notching to any desired angle with the same accuracy as on straight cuts.

Incorporated is a multiple-point, non-repeat punch press clutch which may be set to make one cut with each pressure on treadle, or to cut continuously. For locking clutch in a disengaged position, safety throw-out lock disengages the clutch from power drive to blade while manual adjustments are made. Using the non-repeat adjustment and foot treadle, 60 cuts per minute are possible.

Additional features include: all adjustments conveniently located on front of machine; cutoff length adjustment crank to control distance from edge of blade to back gage; blades of high quality steel with four cutting edges; extra-large working surface table; table provided with holes for affixing protractors; receiving pan set at forward sloping angle under table so that finished parts slide forward as they drop.

Unit can also be adapted for such materials as plastic sheet, mica, card, asbestos, rubber, fiber, and leather.

The Manchester Machine Corp, Box 724, Manchester, Conn



SEMI-AUTOMATIC TESTING MACHINE indexes test pieces through both spot-grinding and Brinell-testing stations. At the rate of 400 parts per hour, crankshafts, gun barrels and other such parts are fed into the machine and slide out ready for inspection. Unit, designated Model RCB, has 30-in. work opening and is hydraulically-operated—*Detroit Testing Machine Co, 9390 Grinnell Ave, Detroit 13, Mich.*

Transparent Sheet Material Offers Many Advantages

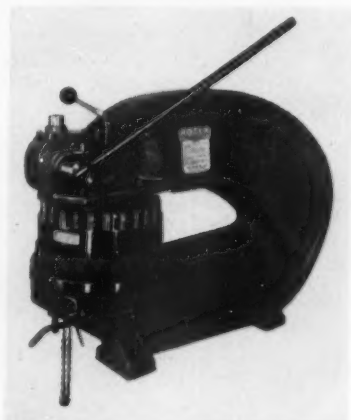
Homalite CR-39, a clear, transparent, scratch and abrasion-resistant sheet material developed from thermosetting resins, offers high optical and mechanical properties. The material has surface characteristics comparable in smoothness and luster to polished plate glass with a higher degree of chemical immunity and quality of resilience.

The product is reported to have a scratch and abrasion-resistance 30 times greater than the more commonly identified available plastics. It is readily machined, drilled, threaded, or routed as required, and has qualities of light-piping and edge-lighting.

Applications recommended are protective guards for grinding wheels, glaze for cab enclosures on industrial cranes, windows for instruments, and faces for dials.

The product is available in sheets in thicknesses of 1/16, 3/32, ⅛, 3/16, ¼ and ½ in. in areas up to 48 by 60 in. Additional information is contained in manufacturer's bulletin No. 1052.

The Homalite Corp, 11-13 Brookside Drive, Wilmington, Del



Quick-Change Punch Press

An 18-station rotary turret punch press that punches any shape hole has been introduced by Rotex.

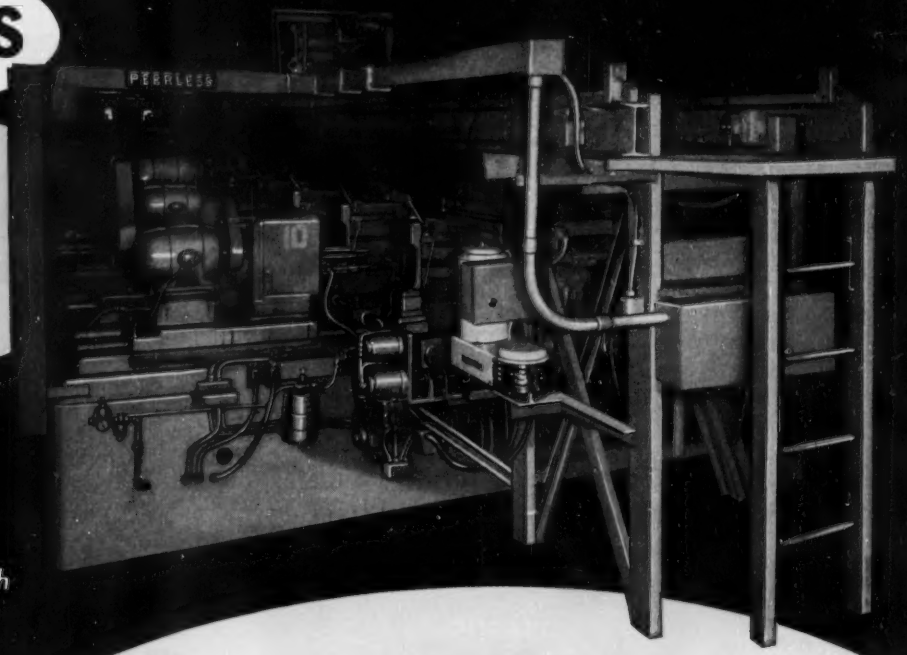
Punch-and-die set is brought into position instantly by a rapid, manual turn of the turret, and locks into place with perfect alignment. Sets can be made to designs, or are available in a wide variety of round or irregular shapes and sizes up to 2-in.-dia. Unit operates on metals, plastics, cardboard, fiberboard, leather, and other sheet material.

Rotex Punch Co, Inc, 2350 Alvarado, San Leandro, Calif

PEERLESS

EXCELLENT ENGINEERING

that does the Never-Before, ***NOW***



like the precision work by this transfer machine which replaced an entire department

Before this PEERLESS, an entire department was employed to process various differential carriers.

Now, this PEERLESS takes these raw cast carriers . . . roughs and finishes them . . . and then completes rough-and-finished boring and facing operations, as well as drilling and tapping—

And still holding precision boring and facing tolerances!

Yet this PEERLESS retains the flexibility of an individual-operation setup!

See other examples of PEERLESS Engineering Excellence that does the *Never-Before, NOW!*

Part and Production: Differential Carrier for heavy truck axle. 40 pieces per hour at 100% efficiency.

Type of Equipment: 8-Station Transfer Machine with 5 working, 1 load and unload, and 2 idle stations, utilizing a hydraulically-actuated transfer mechanism for pallet movement. Power-operated overhead pallet-return conveyor and elevators. Peerless 17"-way floor-type Hydraulic Feed Unit. Peerless hydraulically-actuated Bore Face Unit. Colored-light Operator Control Board.

Tooling: Single-place pallet fixtures with automatic positive positioning. Hydraulically-actuated boring and facing heads. Fixed-center ball-bearing drill heads and individual lead-screw tapping heads.

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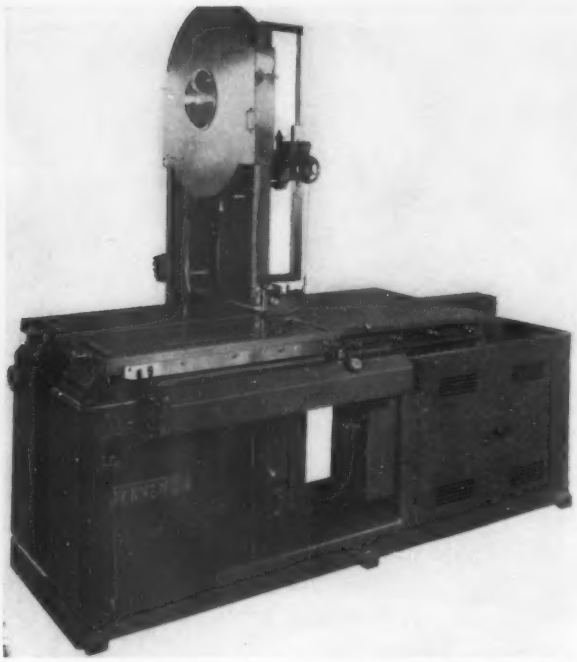
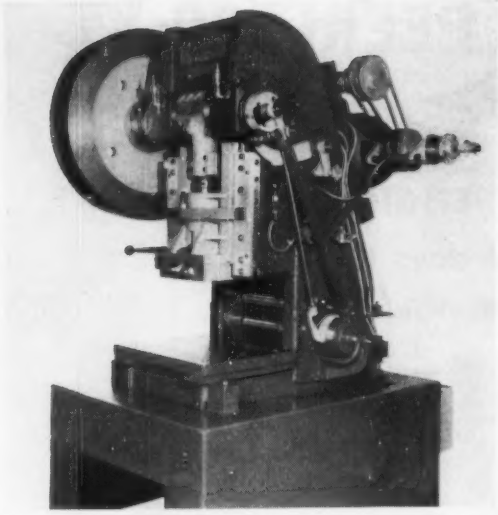


VARIABLE SPEED BANDSAW with hydraulically actuated table designed for metal cutting sizes too large or bulky to be fed by hand. Model illustrated is standard 36-in. bandsaw with 36x37-in. table and hydraulic feed from 0 to 6 ips. Rapid table traverse is provided to point of contact between work and saw—*The Tannewitz Works, Grand Rapids, Mich*



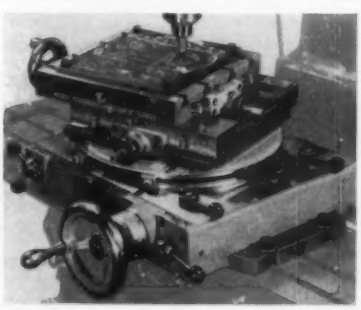
AUTOMATIC STAMPING PRESS, 50-ton capacity, features "Revertomatic" adjustable speed drive which permits clutching at low speed and building to predetermined high speed at adjustable rate. Additional features are: intermittent feed roll brake in phase with machine operation; gear train between feed rolls always in mesh; ram mounted on ball bearings in hardened and ground tool steel raceways; feed rolls infinitely adjustable for 0 to 15-in. feed. Speed is infinitely adjustable from 90 to 350 spm with standard 3-in. stroke—*Precision Welder & Flexopress Corp, Cincinnati 10, Ohio*

Packaged Power Units For Hydraulic Equipment

Self-contained power units for the operation of oil hydraulic equipment were developed for the company's die-casting machines. The units are available in a range of capacities from 7 to 54 gpm for delivery of pressures from 200 to 1000 psi, with horsepower ranging from 7½ to 30. Finger-tip adjustment of line pressure is possible and all piping and fittings are of high pressure steel. Each unit has magnetic starter, push-button control, and is factory-wired. Motor and pump are direct-connected and flange-mounted.

The power unit pumps are completely unloaded when the pressure setting is reached and do not pump against the pressure head. This feature, according to the manufacturer, contributes to long pump life and low power consumption. Rapid operation is facilitated by the 2-in. pipe delivery and return. The unit is complete with reservoir accumulator, baffle-type oil cleaner, automatic water cooling and all electrical switching gear with overload protections.

Harvill Mfg Co, Corona, Calif



Tool and Die Table Reduces Setup Time

Rotary type tool and die table is said to reduce setup time by as much as 50% on simple jobs and as much as 90% on more complex jobs. Highly detailed work may be performed on most standard vertical milling machines equipped with the rotary table.

Work is located and clamped on the 11-in.-square top cross-slide and is never moved until work has been completed. Cross-slides may be adjusted to position work for cutting any radius whose center lies within an 8-in.-square area centered on the table. Stops are provided so standard gage blocks can be used. Rotating portion of table may be turned by a worm shaft handwheel, collar of which is graduated in minutes. This worm shaft may be quickly disengaged, allowing table to turn freely by hand. Expansion-type brake and lock serves to hold table rigid; rotational stops are provided which can be clamped at any point on periphery of rotating member.

Additional construction features include: hardened and ground feed screws and worm; hardened and ground gibs; normalized castings; precision-tapered Timken bearings; base completely sealed against foreign matter, and all internal parts operating in oil bath. Unit measures 9 x 20½ x 18¾ in.

Advance Products, Benton Harbor, Mich

THE SIDNEY MACHINE TOOL COMPANY
50th Year
of service to
AMERICAN INDUSTRY
1904 · 1954
SIDNEY · OHIO

it's a

SIDNEY HEAVY-DUTY LATHE

MAKING A SLEEVE FOR A TOOL GRINDING MACHINE . . .

AT

BELL AIRCRAFT

CORPORATION

IN

BUFFALO, NEW YORK

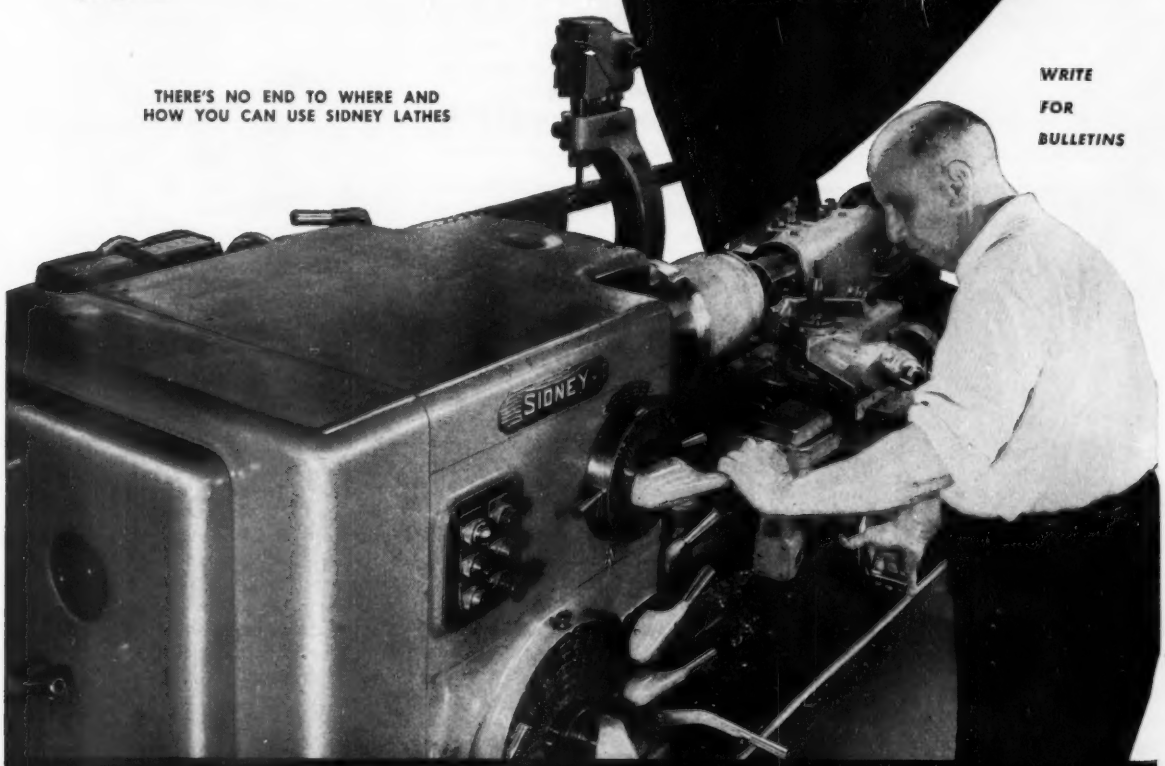
Operations like this are always interesting to concerns who need dependable, cost-cutting lathes for their own products or to build equipment for others.

For example, at Bell Aircraft, Buffalo, New York, this SIDNEY LATHE is making a sleeve for a tool grinding machine which will be used for grinding parts for their rocket engines. Naturally they need and get allowable tolerances of .001 (±) without any trouble.

Bell Aircraft also uses SIDNEY LATHES to machine gear cutters which are used in connection with their guided missile program.

THERE'S NO END TO WHERE AND HOW YOU CAN USE SIDNEY LATHES

WRITE FOR BULLETINS



THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

Famco Squaring Shear Line Includes Foot, Air, Power Types

Squaring shear line expanded to 18 models includes eight power-driven, six foot, and four air types; capacities range from 20 to 14-gage mild steel in 22 to 72-in. sheet widths. Machines are of rugged box table and frame construction. Convenient steel treadle extends entire length of shear and is sturdily reinforced by steel torsion bar.

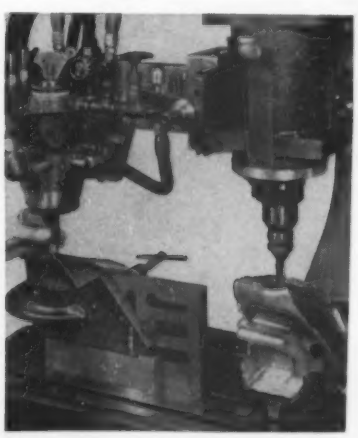
The foot shear line will cut 16 and 18-gage mild steel in 36, 42 and 52-in. widths; 18-gage in 22, 30, and 72-in. widths.

The air shear will cut 16-gage mild steel in 36, 42, 52 and 72-in. widths.

The power-driven shear line illustrated above features the electromatic clutch — the instant action electrically controlled 9-point jaw clutch. Four models have the electromatic clutch only; four other models have the clutch combined with a rugged gear transmission to shear 14 and 16-gage mild steel.

Accessories include: high carbon, high chrome steel 4-edged knives for cutting stainless, high alloy, high silicon and monel steel; ball bearing precision back gage; front gage extension bar, and finger guard.

Famco Machine Co, Kenosha, Wis



True-Trace Hydraulic Tracer Has Three Dimensional Action

This machine tool development was specifically designed to meet the all-purpose needs of the aircraft industry. The new device reportedly enables the airframe manufacturer to make a small number of each different contoured precision part at from twice the speed to as low as 16% of former metal-cutting costs. The company states that if production runs of any part are required, the device turns out the precision parts at a fast rate, and with relatively unskilled labor.

Model A-3D 3-dimensional hydraulic tracer traces 360° in all directions. Any combination of traverse, transverse, and vertical motion is simultaneously controlled by one tracer spindle.

The tracer converts a miller or other metal-cutting machine tool into a high-precision, high-production duplicator and is said to insure tolerances to as close as 0.005 and 0.0005 in. Cutting control techniques allow for positive and constant feed rates, independent of varying operator pressure on spindle. Simple rate controls enable the operator to make feed rate changes quickly, permitting optimum cutting feeds.

The cost of the tracer is $2,750. Additional necessary conversion material includes the hydraulic power unit, hydraulic cylinders, mounting brackets, and miscellaneous hydraulic lines and fittings.

True-Trace Sales Corp, 2303 Chico Ave, El Monte, Calif

Contact Welding Electrode With High Speed Quality

General Electric has announced a high-speed contact welding electrode best suited for work on mild and medium carbon steel. The electrode can be used for many operations requiring AWS classes E6012 and E6020.

It is reported by the company that more metal is deposited per unit of arc energy with this type of electrode, and that it develops up to 80% less spatter than other welding rods. It is encased in a rutile-type covering enriched with iron powder and can be used effectively on horizontal and flat-position fillets and laps, single and multiple-pass butts and deep grooves and cover passes on multiple-pass butt welds.

General Electric, Schenectady 5, NY

AIR-OPERATED GAGE inspects the skirt contour of pistons for 6-cyl engines. Gaging fixture and centralizing table are mounted on an index table, graduated in 5° increments. Tungsten-carbide measuring contact is reed-mounted and horizontally adjustable. Magnification of the standard single-dial CompAlRator is 415 to 1 with dial graduations of 0.0002 in. Built-in master setting device insures accuracy. The piston is held between a V-block locator and a cushion block and after the centralizing table has been adjusted to the individual piston, the oval-shaped skirt contour can be checked for deviation at any radial point. An optional model uses three-jaw centralizing mechanism instead of table—*Taft-Peirce Mfg, Co., Woonsocket, R I*

Range: 36 inches O.D. blank down to a fraction of an inch. Maximum capacity between centers: 80 inches. Special machines have been built to handle diameters up to 6 feet. Shown above is External Geargrind Machine, model GG10X48A.

Speed and Versatility

for Formgrinding Parts Like These . . .

Actual operating experience shows: these automatic Geargrind Machines will equal or exceed the continuous production rate of other similar-purpose machines. And, they will do a greater variety of work: aircraft, automotive, machinery, etc.

Gears, splines, and specially contoured parts of all kinds are turned out quickly, accurately on versatile Geargrind Machines.

The complete line of machines pioneered and developed over 45 years by Geargrind is described and illustrated in the new 8-page catalog. It's yours for the asking—write on your company letterhead, please.

FORMGRIND on
Geargrind Automatics

GEARGRIND Detroit

THE GEAR GRINDING MACHINE CO.
3919 CHRISTOPHER, DETROIT 11, MICHIGAN

E-2

Indicating Thread Gages For Quick Inspection

Scherr line of indicating thread gages includes roller thread pitch-diameter comparator gage and dial thread plug gage for checking internal threads. Both instruments have been designed for quick inspection by unskilled operators.

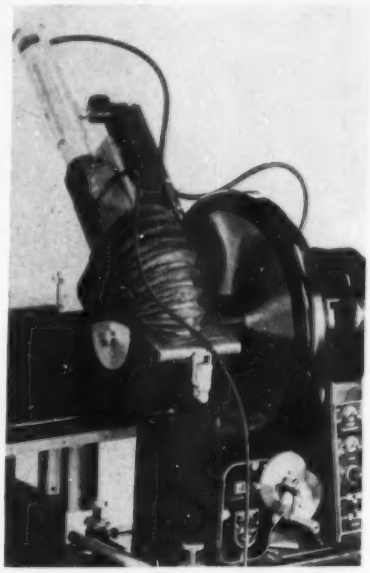
The pitch-diameter gage has an indicator reading to 0.001 in. and is set by means of a master thread gage. Two tolerance hands on outside of dial are set to required tolerances. Thread to be checked is inserted between two rollers and variations in pitch diameter are read from dial. Not only "go" and "no-go" tolerances are determined but also the thread's position within the tolerance field. Out-of-bound errors are discovered by turning the work between measuring rollers. Micrometer screw provides coarse adjustment and spring pressure on the indicator can be adjusted by screw below micrometer thimble. Measuring range is up to 2-in. thread diameter. A special pair of rolls is needed for every type of thread and lead.

The dial thread plug gage measures internal threads by means of three interchangeable measuring jaws of which the middle is retractable between the other two. The jaws are first inserted in a ring gage and the indicator set to zero, then used on the work with variations observed on dial previously set to prescribed tolerances by two adjustable hands. The middle jaw retracts when lever below indicator is pressed down, the measuring jaws are inserted into the bore and upon release of lever, engage the thread inside of bore under spring action. The two fixed lower jaws center the instrument in the threaded bore, and the upper movable jaw transfers its movement to the indicator. Size ranges are 3/16 to 1 in., 1 1/16 in., and 2⅛ to 4¾ in.

George Scherr Co, Inc, 200 Lafayette St, New York 12, NY

Magnetic parallels and V-blocks in all sizes and shapes are available in a low-cost line designated Magne-Blox. Units may be used on all types of magnetic chucks, including permanent magnetic type. Universal set consists of two parallels, 1 x 1¾ x 3¾ in., and two V-blocks, 1¾ x 2⅜ x 1⅞ in. in finished wooden case; price, $22.25. Other standard sizes available; specials made to specifications.

George Scherr Co, 200 Lafayette St, New York 12, NY



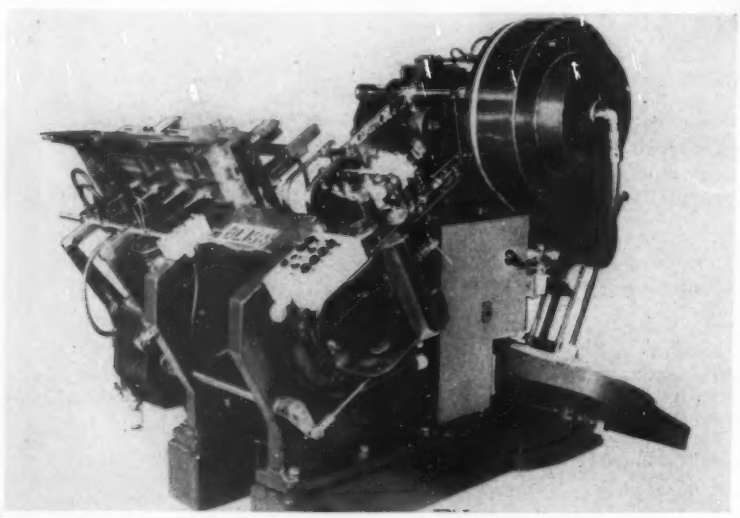
Norelco Helium Attachment For X-Ray Spectograph

Attachment for Norelco X-ray spectograph units permits use of helium instead of air in path of X-ray beam. Helium atmosphere extends useful spectrum range of the analysis equipment. With an air path and a rock salt analyzing crystal, consistently good qualitative and quantitative results have been reported possible in the spectrum from calcium to uranium.

With helium, present work now extends down to sulphur. One test result shows that a fuel oil specimen containing 0.86% sulphur gave a net intensity of 16 counts per sec. above a background count of 0.8 counts per sec.

Accessory equipment now includes a new housing that encloses the X-ray tube and provides compartment for specimen holder, a new plate-type collimator with mounting, an accordion-shaped rubber jacket that encloses the analyzing crystal.

Research & Control Instrument Div, North American Philips Co, Inc, 750 S Fulton Ave, Mt Vernon, NY



AUTOMATIC STRIP FEED PRESS, designed for high-speed operation produces sanitary can ends and closures. The press is reported to operate satisfactorily at speeds above 300 spm. Features include: combination disk friction clutch and brake, electrically controlled; balanced crankshaft, 4 to 6-in. dia at bearings and crankpin; feed bar, driven positively by crank and incorporating adjustable fingers; elimination of idle stroke between strips; bolster area increased to 17 in. front to back and 16 in. left to right; press timing arranged for slide to stop automatically at top of stroke. Bliss has also introduced an automatic double-end curler used to curl can ends. The curler gives 270° of curling time for each can end. Larger curling wheels add to curling time.—*E W Bliss Co, Hastings, Mich*

RUST-PROOF
IRON AND STEEL . . . FOR YEARS !

ZRC — new protective coating — "cold galvanizes"
Costs 1½¢ per sq. ft. of 100% rust protection

Corrosion your problem? **ZRC** — new metallic zinc-rich coating — completely protects iron and steel under conditions where all other normally used coatings fail. And **ZRC** gives this greater protection at lower coverage cost — 1½¢ per sq. ft.

ZRC's Record of Results — **ZRC** painted on gas storage drums in an ocean-side location, withstood corrosive action of salt spray, weather, for 6 months, to date. Ordinary protective coatings failed within 2 months.

ZRC sprayed on steel frames used in steam curing treatment of cement block manufacture, kept frames good as new for better than 6 months. Frames normally broke down and were replaced well within this time period. Net savings — over $4,000 yearly on replacement costs, using **ZRC.**

ZRC Easy to Apply — **ZRC's** unique vehicle prevents settling of metallic zinc — makes spraying possible, requires no repeated stirring while brushing on **ZRC.** Used either way, **ZRC** forms a tough, firmly adherent coat — touch dry in 30 minutes, completely hard in 4 hours.

ZRC can be applied directly over adherent rust, mill scale, pitting — prevents further rusting, allows no sideways spread beneath the **ZRC** coat — no rust "creepage".

what is ZRC?

ZRC is a zinc-rich coating that protects iron and steel as effectively as hot dip galvanizing or electroplating. **ZRC** contains 93%-95% metallic zinc in a vehicle that prevents settling. A normal coating of **ZRC** deposits ¼ oz. metallic zinc per sq. ft. of surface. It is firmly adherent. **ZRC**'s action is electrolytic and sacrificial. The zinc becomes anodic (A & B, diagram), while the protected iron or steel becomes cathodic, (A^1 & B^1, diagram), in the presence of water vapor. Corrosion attacks at the anode — the zinc layer — forming a film which itself helps retard further corrosion. The cathodic iron or steel is untouched.

Full engineering assistance available

Bring your toughest problems to us. The Sealube staff of corrosion specialists is prepared to help you save time, labor, maintenance costs.

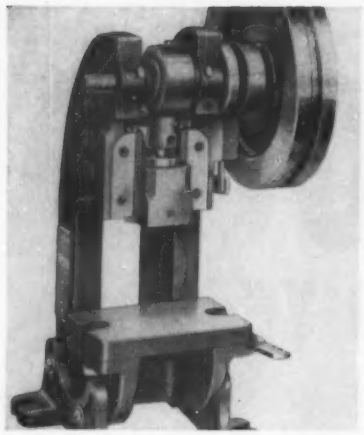
ZRC SAMPLE

Test **ZRC.** Sample quantity —enough to cover 8 sq. ft.— is available. Also **ZRC** information folder. Write Dept. A

CAULKING AND COATING DIVISION

The SEALUBE Company

WAKEFIELD, MASSACHUSETTS

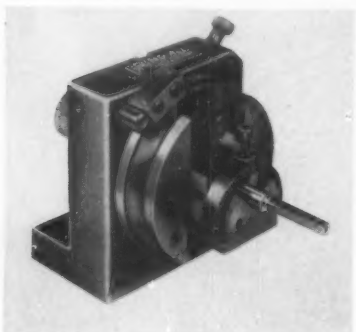


Kenco Midget Press Has 1½-Ton Capacity

Kenco announces a precision-built Midget punch press. The machine follows the general lines and specifications of the 4- and 5-ton Kenco presses. It is rated at 1½ tons for continuous heavy-duty work, and offers ¾-in. stroke as standard with 1 in. optional. Construction is of open-back, inclinable type.

Features of the machine include: solid alloy steel crankshaft, heat-treated and precision ground; roller-bearing-mounted fly wheel; clutch mechanism self-contained and independent, alloy steel drive collar, heat-treated and ground; special alloy bronze connecting rod and crankshaft bearings; ram and ram guides of 90° V-type; special alloy cast frame, pre-heat-treated, tested and precision-machined.

Kenco Mfg. Co, 5211 Telegraph Road, Los Angeles 22, Calif



Improved Version of Grind-All Fixture

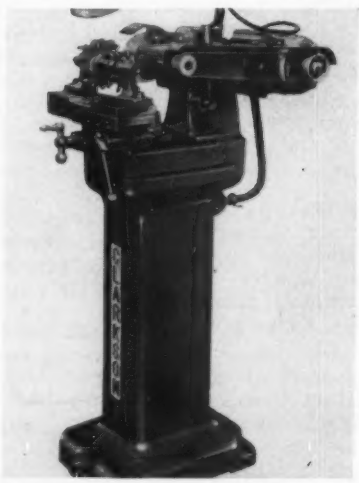
Improved version of Harig Mfg grind-all fixtures was designed for faster, more versatile, and more economical perforator grinding operations. It grinds all types of regular and irregular contours concentric with perforator shank within ±0.0002 in. Due to an exclusive radius generating feature, fixture is particularly adapted to carbide grinding.

Twenty-four 15° graduations on a rotating index plate assure grinding accuracy; adjustable stops permit swing to any number of degrees. Preloaded ball-bearing type of construction has been incorporated, and fixture is completely hardened and ground.

Protective seals, plus the feature of overlapping parts, insure against dust and grime. Light, compact construction is said to permit easy handling on any type of setup.

Fixture can also be used for light milling, boring, drilling, and inspection operations.

Harig Mfg Corp, 5757 W Howard St, Chicago, Ill



Clarkson Cutter Grinder For Volume Production

Clarkson cutter grinder is reported to have all the advantages necessary for volume production of cutting tools. With this machine, cutters can be set and completely sharpened, in from 15 to 25 min. Powered by ½-hp. motor, the grinder is always operated from the front with the work in easy view of the operator. A lamp, adjustable at any angle, provides concentrated illumination of the work.

Machine is said to be ideal for sharpening end mills, slot drills, reamers, woodruff cutters, T-slot cutters, side and face cutters, cylindrical cutters, face mills, angle cutters, and hollow mills.

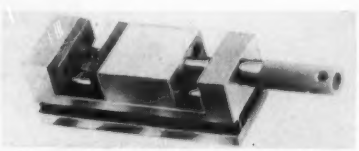
Equipment can reportedly be supplied to permit all straight and Morse taper shank cutters to be sharpened, and all size side and face cutters up to 6-in. dia and 1-in. dia and 1¼-in.-dia holes.

Clarkson, Inc, 320 Ontario St, Toledo, Ohio

Mechanical Comparator Magnifies to 3000X

This vertical mechanical comparator, manufactured by Sigma Instrument Company of England, is used for checking dimensions of parts at production line, in tool room, or inspection department. Magnifications range from 500 to 3000X with capacities of 6 in. and 12 in. in each magnification. Moving parts are mounted in ball bearings; vertical adjustment is provided for head and table with final setting on scale. Uniform measuring pressure on spindle reportedly makes accurate readings possible over entire scale range (0.012 to 0.002 in.). Throat depth on all models is 3¼ in. Prices range from $270 up.

Imported by Cosa Corp, 405 Lexington Ave, New York City 17, NY

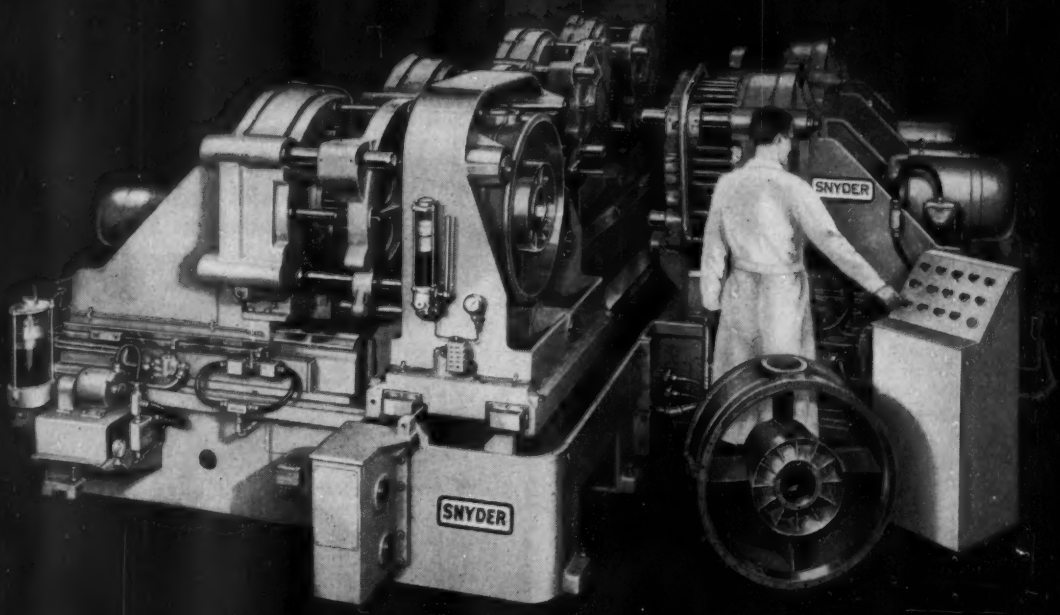


Toolmakers' Vises

Vises are precision ground on all surfaces to a non-cumulative square and parallel error of 0.0004 in. per inch. Dovetailed slide guarantees rigidity and parallelism and is adjustable for wear. Hardened and ground jaws can be removed for reconditioning or replacement with special jaws. Leadscrew is totally enclosed to prevent entry of dirt. All parts are hardened except leadscrew.

Vises are available in three sizes. No. 1 has 1¼-in.-wide jaws, 7/16 in. deep, with 1-in. opening. No. 2, 1⅞-in. wide, 11/16 in. deep with 1½-in. opening. No. 3, 2½-in. wide 15/16 in. deep, 2-in. opening. Prices are: $18.40, $33, and $55, respectively.

Air Transport Equipment, Inc, Box 25F, Mineola, NY



SNYDER SPECIAL

4-STATION, AUTOMATIC LINE INDEX

MACHINE DRILLS, REAMS, CHAMFERS

420 HOLES AN HOUR IN SIX LARGE

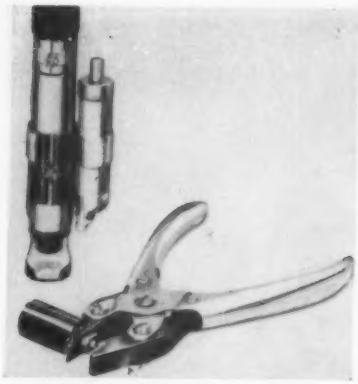
CAST ALUMINUM AIRCRAFT PARTS

AT 80% EFFICIENCY.

SNYDER

TOOL & ENGINEERING COMPANY
3400 E. Lafayette, Detroit 7, Michigan

29 Years of Successful Cooperation with Leading American Industries

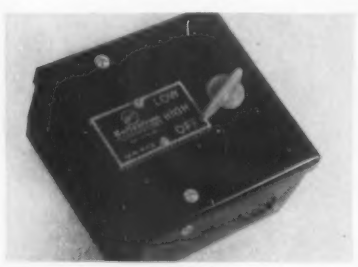


Precision Hardness Tester For All Sheet Metal

Model 317 sheet metal hardness tester is said to offer a more precise method of testing both ferrous and non-ferrous sheet metal. Use of calibrated microscope and reticle allows readings to be obtained within two points on the Brinell scale. Microscope has self-contained battery-type illuminator.

Sheet stock of from 0.010 to 0.250 in. may be measured; instrument operates by using ⅛-in. ball with 150-kg load. Precision-ground spring is used to load the ball; pressure is applied by special pair of parallel jaw pliers. The indentation formed is measured with the microscope reading directly on the Brinell scale. A limiting pad forms all indentations with the same load. Price: $78.75.

Pacific Transducer Corp, 11921 West Pico Blvd, Los Angeles 64, Calif



Speed Control Developed For Fractional-hp Motors

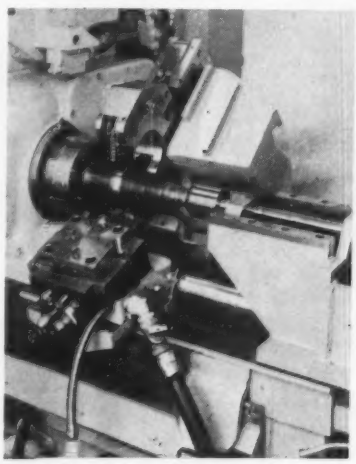
A speed control for fractional-hp shaded-pole motors has been added to the Ballastran line of transformers and coils.

Available for three-speed operation, unit has an air-gap design which is said to assure starting at low voltages and eliminate core saturation,—the cause of heating, current distortion, and reduced motor torque.

Three models are: 1) cased control—for remote control installations; control reactor and switch are mounted in an outlet box for permanent installations; knock-out holes are provided for wiring; 2) panel-mounted control—to permit single-hole mounting on panels for convenience in specific applications; 3) chassis-mounted control—for mounting control reactor within the fan base or blower enclosure. Lead length can be provided to suit any application, and size of control varied to fit the enclosure.

Because of possible variations of motor types, applications, and speed requirements, these speed controls are designed for specific application. Furnished information should include: motor voltage, current and watts at reduced speed; preferred model, and overall dimensions.

Ballastran Corp, 1701 N Calhoun St, Fort Wayne 7, Ind



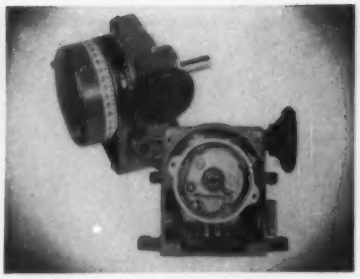
Thread Rolling Attachments for Fay Automatic Lathes

This precision attachment announced by Salvo mounts on the back cross slide of the lathe and operates at the machine's normal spindle speed. Actuated by a standard cam, the attachments are being used to roll special 3¼-in.-12 threads.

Salvo claims that the rapidity and accuracy of the attachments allow them to automatically position themselves on the work from the back cross slide and to form the close-tolerance external threads in 30 spindle revolutions. A taper is turned and the thread blank formed on the front cross slide of the machine. Close control of the pitch diameter is reportedly exercised by the accuracy of the thread rolls and by holding the blank diameter to a 0.003 in. tolerance.

Thread rolls in any diameter and pitch up to the capacity of the machine can be obtained.

Salvo Tool & Engineering Co, 26441 Gratiot Ave, Roseville, Mich



Coordinates Electric Circuits With Mechanical System

The Farmer Rototimer provides means for coordinating the angular position of a rotating shaft and the opening or closing of an electrical circuit. Device incorporates a cam-operated, single-pole, single-throw switch externally adjusted through 360° in either direction, so that the switch operates at any point in the rotation of the shaft. Adjustment is made by handwheel operating a 25 to 1 worm gear with scale showing the position of the operating point in degrees. The operating point of the switch can be adjusted while the connected machine is in motion.

The switching element is a set of automotive distributor points noted for long life at high speed. These contacts are actuated by a hardened and polished steel cam; cams are available for either normally open or normally closed circuits.

The electrical system is designed to handle one amp at 125 volts ac.

Farmer Electric Co, 21 Mossfield Rd, Waban, Mass

Plastic-Enclosed Thermostat For Humidity Service

Special series of thermoswitch thermostats completely enclosed in plastic sleeve has been developed for severe humidity, corrosion service.

Device can be used for temperature control or overheat detection for such applications as plating baths, pickling baths, humidity and corrosion testing chambers. It operates at any temperature within a range of +10 to +165 F, handles current loads of 10 amp, 115 volts ac, or 5 amp at 230 volts ac.

The following modifications can be specified: operating temperature preset at plant and adjustable in field; thermostat contacts open or close at set-point temperature; lower end of plastic enclosure is cylindrical or flattened.

Fenwal Inc, Ashland, Mass

Unless your operators work for nothing...

The savings in time alone will pay for New

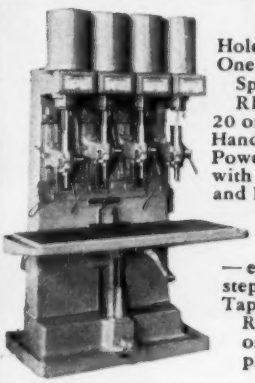
LELAND-GIFFORD DRILLING MACHINES

Convenient central controls, stepped-up speed, reduced work handling, built-in safeguards against costly errors, fast speed changes, quick adaptability to different jobs are some of the time-saving features of the new Leland-Gifford Drilling Machines which make it possible for the average operator to greatly increase machine production. And with the added advantage of higher precision, he can produce *better* work at the same time.

Leland-Gifford offers a complete line of motor spindle drilling machines — plus unsurpassed engineering skill and facilities for designing special tooling and adapting standard machines to meet any production drilling need. A Leland-Gifford field engineer can show you how to improve production and lower drilling costs with Leland-Gifford methods. Call the office near you.

No. 1LMS

Smallest holes up to 5/16"
Bench or floor types
One to Six Spindles
Speeds up to 10,800 RPM
12 or 20 inch Swing
Hand or Hydraulic Feed
Tapping by Friction
Tapping Attachment

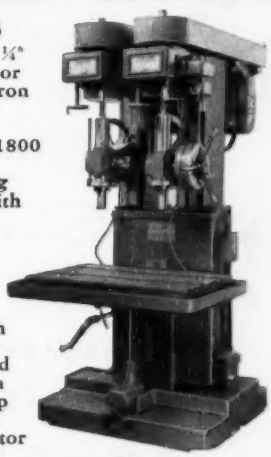


No. 2LMS

Holes from 1/16" to 3/4"
One to Six Spindles
Speeds up to 3600 RPM
20 or 26 inch Swing
Hand Feed;
Power Feed with three feed rates and Positive, Adjustable Depth Stop; or Hydraulic Feed — either plain or step-by-step.
Tapping by Reversing Motor or Friction Tapping Attachment

No. 3MVB

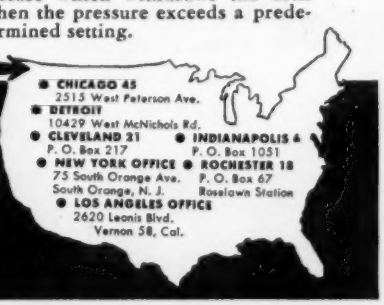
Holes up to 1¼" in Mild Steel or 1½" in Cast Iron
One to Four Spindles
Speeds up to 1800 RPM
24 inch Swing
Power feed with three Rates, Adjustable Depth Stop and Safety Slip Clutch.
Also can be furnished with Hand Feed or Hydraulic Feed — either plain or step-by-step Tapping by Reversing Motor



HYDRAULIC FEED

Two types of hydraulic feed are available — the well-known step-by-step type for deep hole drilling; and a plain feed for shorter holes or reaming. With either type the feed rate is *infinitely adjustable* and *independent*, and the maximum thrust pressure may be regulated with an overload release which withdraws the drill when the pressure exceeds a predetermined setting.

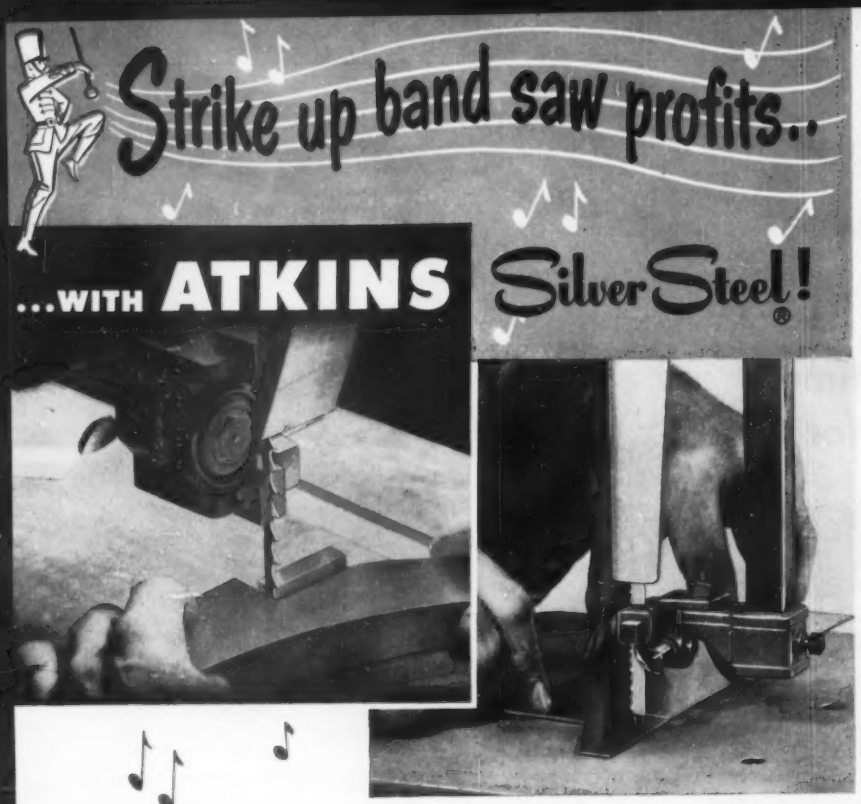
SAVE DAYS — CONTACT THE OFFICE NEAREST YOU



LELAND-GIFFORD

Drilling Machines

WORCESTER 1, MASSACHUSETTS, U.S.A.

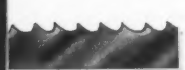


Remember... IT'S THE BLADE THAT DOES THE CUTTING!

BUY ATKINS Silver Steel Metal Cutting Bands AND GET:

- The *Right* Blade for Contour or Cut-Off Sawing
- The Finest Saw Steel for Longer Cutting Life
- The Correct Tooth for Fast, Free Cutting
- Lowest Maintenance Costs.

CONVENTIONAL TOOTH . . . for top performance in the toughest ferrous metals



CURLED CHIP BUTTRESS TOOTH . . . the original, Atkins Skip Tooth . . . for cutting all types of non-ferrous metals, plastics, fibre and wood

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INDIANAPOLIS 9, INDIANA

ROUND TABLE Discussion

SUPER SALESMAN

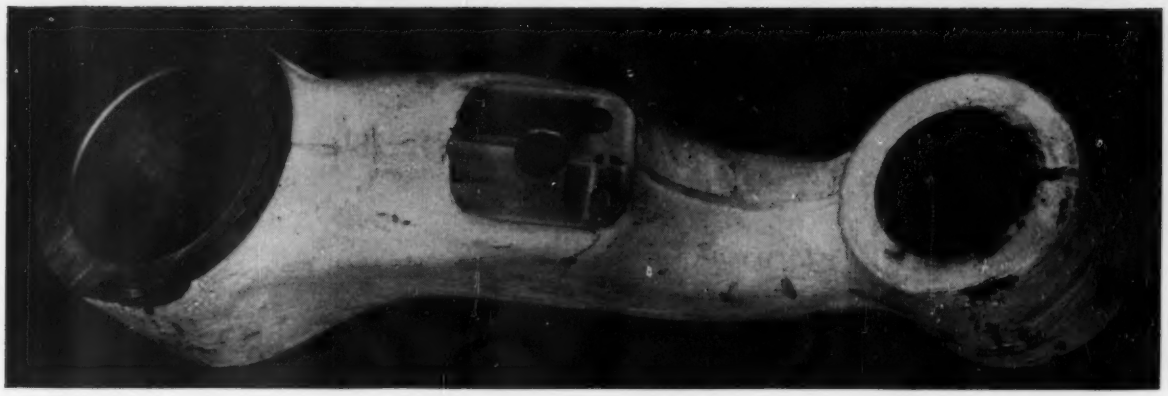
How much leeway should the salesman be allowed in the shop? Once he has gained the foreman's confidence, should he be permitted to talk individually to the workers, or must his visits always be supervised?

A SALESMAN IS EMPLOYED to bring consumption into equilibrium with production. He puts enterprise into our economic system. His successful efforts mean job security for the worker, profits for the enterpriser, more goods for more people, and a balanced economy. The super-salesman promotes his product. He can change a need into a demand. The engineering salesman has technical know-how. He knows why his product was designed; how it was manufactured. The salesman wants you to succeed as an enterpriser. He should be a welcome visitor.

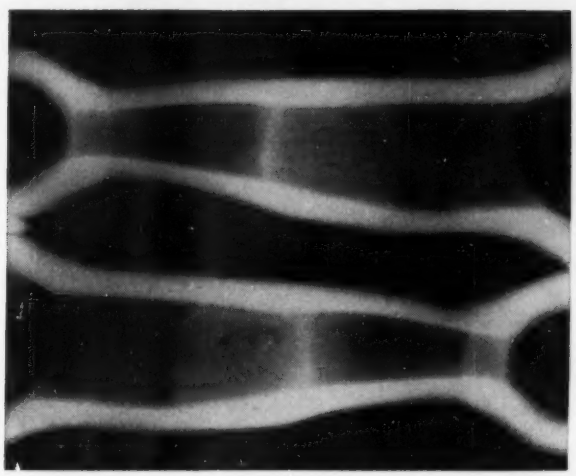
One may learn much from the engineering salesman. He has practical knowledge and technical training. His advice can be an asset to your business. The salesman is an observant fellow who gets around. He knows the strength of your competitors. He has an understanding of current business trends. He sometimes represents an enterprise which is more successful than your own. His enthusiasm, his optimism, can be contagious. Like all persuasive speakers he must have your good will before going into his act. Courtesy to an industrial salesman may be bread cast upon the waters.

A salesman sometimes exerts efforts over and above those ordinarily expected of him. He may need the commission, or be ambitious, or really believe in his product. He may try to influence your decision through others. He may want to look around your shop. He should have your permission to do this; give it to him if possible. He will be in a better position to appreciate your problems. The salesman's ability to influence people may get his product a better test in the shop. One should not fear such a challenge. You can take your time about signing an order.

The salesman realizes that it is more difficult to sell a group than an individual. Shop men are more familiar with certain details than are design engineers or purchasing agents. A workman is not going to



Ankle Bone for tons of tank—



RADIOGRAPHY proves it sound

It's the support for the track wheel of a tank —a tough job if there ever was one. Failure would mean complete disablement.

With soundness so vital, every casting was radiographed. It's the one way to prove that no hidden flaw exists without destroying the part.

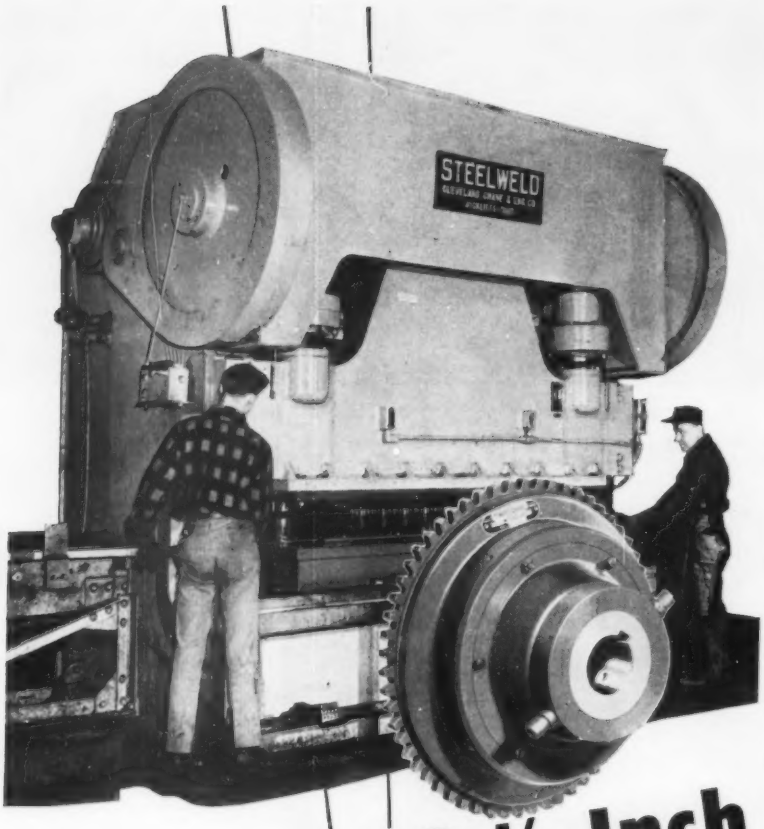
Radiography forestalls releasing imperfect castings—helps build reputations for consistently good work. This is why it is more and more becoming a routine procedure in many foundries.

If you'd like to know how Radiography can improve your own operations, discuss it with your x-ray dealer. Also send for a free copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography...
another important function of photography

Kodak



Slots 6,000 ¼ Inch Bars Per Day!

This Model K5-8 Steelweld Bending Press has been in continuous 24-hour service since 1945. One of two machines operating at the MacDonald, Ohio, plant of a leading steel producer, it punches 37 slots in ¼" thick bridge bars at one time.

Power linkage is supplied by a Twin Disc Model E Friction Clutch . . . and such performance is typical of Twin Disc Clutches, for their wider surfaces, higher grade friction materials, and more rugged construction provide the clutch characteristics *demanded* for hard operation. That's why so many of the nation's leading builders of industrial machinery *standardize* on Twin Disc Clutches and Fluid Drives.

Twin Disc Model E Friction Clutch (shown above) is available in one-, two-, and three-plate construction; sizes 14" to 42". Ask for Bulletin 108-F.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

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betray a hard-won bit of knowledge for a gaudy cigarette lighter. This gift represents a good-will offering. It is not a bribe. It will get the salesman a hearing. Shop critics are hard to fool, and they lack authority to buy. The salesman is jeopardizing his sale to win good will at the grass roots. If he will put his product to this test help him do so.

The front office buyer needs an open mind. Such an attitude is essential to change; change is essential to progress. Progress is that which will allow the free enterprise system to produce more goods for more people at less cost.

It takes a super salesman to change your mind. Thus super salesmen are essential to progress. They go where there is a need, win the good will of the buyer, demonstrate their product, create a demand. The career salesman will not offend you with high pressure methods. Treat him as you would want to be treated if you were in his position.

Peter A Seward
West Lynn, Mass

WHILE IT IS THE DUTY of a salesman to present his product in the best possible light, the right to demonstrate its performance in the prospective buyer's plant is a right that very properly belongs to the plant owner or his representative. Once the salesman has been invited to give a demonstration of his product, if he is the right type of individual, he will go about the demonstration as efficiently as possible and with the minimum disruption of plant routine.

He will do this, not merely because good manners are an accepted part of good business ethics, but it is also good business. If the foreman, or any representative of the company is standing by to watch the demonstration, he is not going to feel too kindly toward the demonstrator if he makes a big production out of it, especially if he is the type of ballyhoo artist who doesn't feel happy without a crowd around him laughing at his witticisms. The fact that his audience is costing the company several dollars an hour per head in lost productive time is certainly not going to endear him to the company representative who has been delegated to watch the demonstration. Having been exposed to both types of sales demonstrators I have usually found that the man who went about his business without any fanfare or commotion in most cases was the fellow who really had something to offer and very seldom

TIGHTEN YOUR GRIP ON PRODUCTION

Production flows faster and smoother when your machine tools are equipped with Jacobs Chucks.

Rugged construction, great gripping power and accuracy have made The Jacobs Plain Bearing Drill Chuck the choice of machinists throughout the world.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A JACOBS IT HOLDS

Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

. . . first in chucks

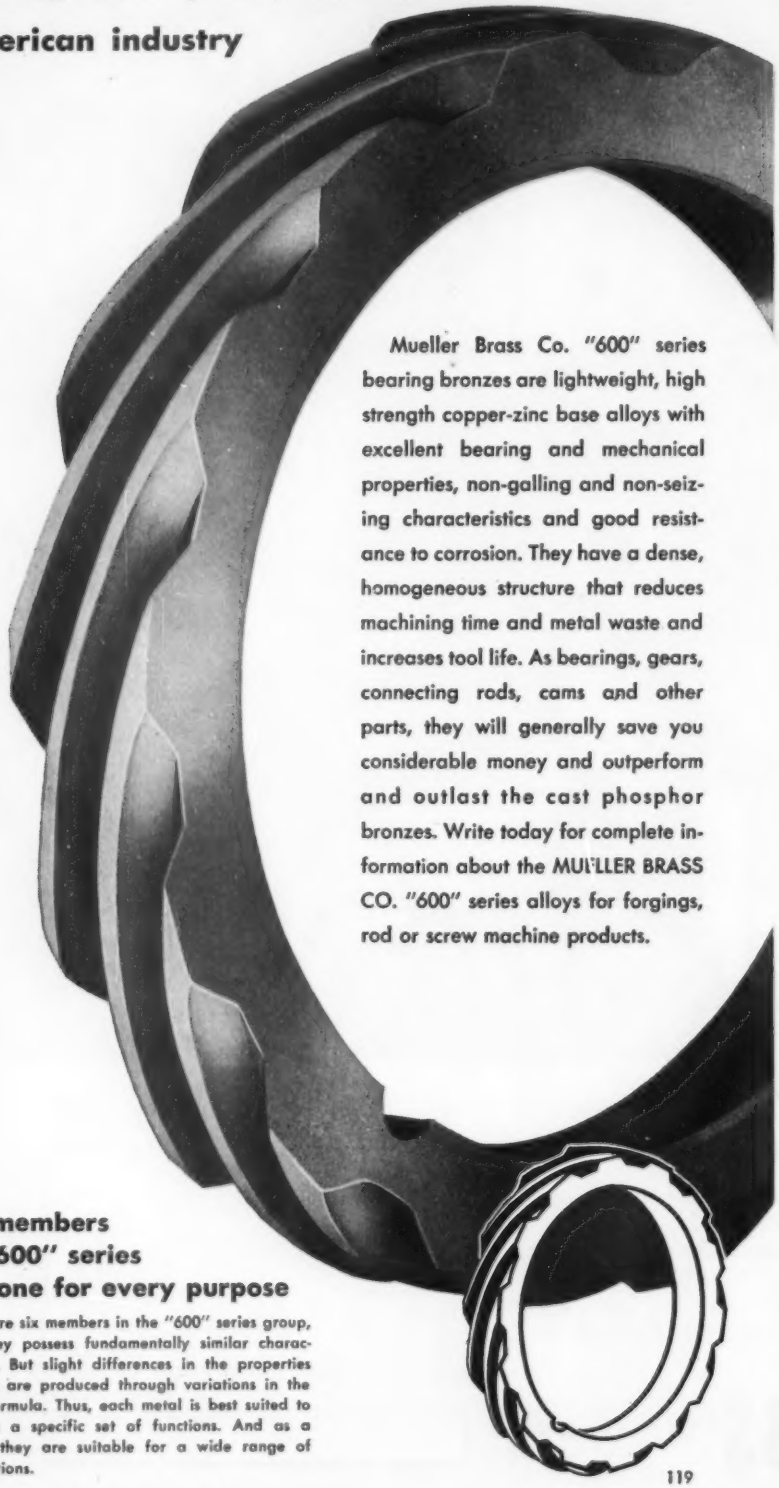
. . . first in service

MUELLER BRASS CO.

600 SERIES BEARING ALLOYS

FORGINGS • ROD • SCREW MACHINE PRODUCTS

proving their quality throughout American industry



Mueller Brass Co. "600" series bearing bronzes are lightweight, high strength copper-zinc base alloys with excellent bearing and mechanical properties, non-galling and non-seizing characteristics and good resistance to corrosion. They have a dense, homogeneous structure that reduces machining time and metal waste and increases tool life. As bearings, gears, connecting rods, cams and other parts, they will generally save you considerable money and outperform and outlast the cast phosphor bronzes. Write today for complete information about the MUELLER BRASS CO. "600" series alloys for forgings, rod or screw machine products.

six members of "600" series . . . one for every purpose

There are six members in the "600" series group, and they possess fundamentally similar characteristics. But slight differences in the properties of each are produced through variations in the basic formula. Thus, each metal is best suited to perform a specific set of functions. And as a group, they are suitable for a wide range of applications.

119

MUELLER BRASS CO. PORT HURON 23, MICHIGAN

left the plant without an order in his pocket.

From my observation over the years I am inclined to believe the brash, too aggressive type of salesman, with his pocket full of "souvenirs" will soon be a memory, along with the oldtime medicine show, and the vendor of snake oil.

Nowadays, the machine-tool salesman is more likely than not to be the possessor of an engineering degree, or the equivalent in theoretical and practical knowledge. He may not be as colorful as his oldtime predecessor, but there is much more to be learned from his conversation, based, as it usually is, on facts. Of course, once in a while—as in Ed's case—a salesman may construe an invitation to give a demonstration as a license to take over the place and make a general nuisance of himself. But a little cooperation between the purchasing agent and the shopman can screen out this type of individual.

Robert S Alexander
Glastonbury, Conn

•

SHOPKEEPER

Who should sell hand tools and gages to the shop mechanics? Can one man be allowed to handle it on his own, or does this amount to an unfair monopoly? Is there one best way to handle tool sales?

IN OVER 50 YEARS of experience in various kinds of shops, I saw all kinds of arrangements for helping the new (and also, regular) employees obtain all the tools required in their activities. Some of these arrangements stand out as horrible examples.

In Pennsylvania, in a shop somewhat similar to the one where Ed and Al gather their experiences, the storekeeper took into his own hands the sale of tools, but, knowing nothing of altruistic principles, he added transportation to the catalog price and pocketed it in addition to the discount his position entitled him to. At times, competition raised its head (for the German toolmakers and others did not see the necessity for paying good, hard-earned money for questionable service), but the lack of discount made it short-lived. I heard later that, encouraged by this easy way to make money, he monkeyed with company funds and disappeared.

In another shop, the toolroom foreman, in order to reduce lost time, attempted to provide the tools at the regular discount, but the necessity for keeping track of partial payments, and legal entanglements,

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McCASKEY TOOL CONTROL *pays for itself several times a year . . . .* IN A SMALL SHOP, TOO

The many improvements and savings resulting from complete control of tools in the small plant of Lawler Automatic Controls, Inc., Mt. Vernon, N.Y. are described by James Lawler, Jr., Vice-President, in a recent article in IRON AGE.

Manufacture of Lawler thermostatic control valves requires a wide variety of standard and special tools for their 35 to 40 production employees. Production delays from missing tools formerly were frequent and tool expense was high.

Here are a few of the results secured with their simple McCaskey Tool Crib Control system, quoted from Mr. Lawler's statements:

. . . tool crib service is much faster.

. . . quick location of tools on production floor or in the crib saves an average of two hours a day of a machine operator's time.

. . . faster crib service saves many hours of machine down-time.

. . . time required by crib attendant to check tools in and out reduced 70 to 75%.

. . . tool costs have been reduced from 35 to 50%.

. . . breakage records make employees more careful about tool use and abuse and provide for quick replacement of damaged tools.

. . . guesswork has been taken out of ordering and stocking tools through simple and accurate inventory and activity records.

. . . tool hoarding and loss have been reduced, disputes between crib attendant and machine operators are prevented.

The system paid for itself several times over the first year of its use.

Let us send you Mr. Lawler's article and complete facts on McCaskey Tool Crib Control showing how you can have similar results in your plant, large or small.

McCASKEY REGISTER DIVISION
Victor Adding Machine Company
ALLIANCE, OHIO

Please send me the article describing use of McCaskey Tool Control by Lawler Automatic Controls, Inc. and complete facts concerning the McCaskey system.

Name .....

Position .....

Company .....

Address .....

AM-3-54

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION - INVENTORY
TOOLS - MAINTENANCE - COSTS
THE McCASKEY REGISTER DIV.,
Victor Adding Machine Co.
ALLIANCE, OHIO
Galt, Canada Watford, England

when a deadbeat tried to leave the plant without paying for his purchases, took so much of his own time that he was obliged to abandon the project.

In another case, the company itself furnished to its apprentices the tools at cost, but refused to extend the service to all employees, because of bookkeeping cost.

The least objectionable arrangement was in a Rhode Island plant where a retired toolmaker with a long service record was allowed to come into the shop and sell tools. As a retired man, no employee objected to the small profit he could make (he gave generous discount) and his time being his own, there was no question of company time being used. Owing to his long experience and to his agreeable disposition, in a short time he advised apprentices and others on the best tools for their requirements, and at any time he would make a trip to Providence to obtain any tools required.

Before long, he bought drafting tools, and I have a suspicion that the company also made use of him. He had plenty of time to keep his accounts straight, and his contacts with the shop helped him keep his spirits up. At last reports, he was getting quite feeble, but the system worked so well that there were a couple of retired men ready and willing to continue his work.

P P Fenaux
Lynn, Mass

COME NOW, Al, old boy, are you one of those so-called joy-killers whose mind is so filled with technicalities that it is inflexible to the highest degree? Can't you bend enough to let a poor sucker rake in a few extra cartwheels so that he can pay off some of his debts? Why pour cold water on a warming fire by objecting to a thing that is nothing more than a convenience to the shop and the men therein?

"You the new operator who raised the production quota of our entire department by working through his lunch hour every day?"

What if a fellow does earn a few extra dollars by selling mikes and whatnots during working hours; wouldn't it make your blood surge a little sweeter if you gave him credit for his initiative? You know, Al, the person who has initiative is one who has guts and the very foundation of successful free enterprise is just that —guts—that little extra shove that the average person is fearful of doing because he thinks that in so doing he is cheating himself out of a good time at doing something else. So don't be such a sourpuss, Al, and strive to put a damper on the man's efforts.

Remember the kick you got out of it when you were a kid selling papers on the street corner? Unfortunately, poor Jones was cheated out of that thrill because he had to quit school and go to work in industry. We can consider him as being a delayed-action kid, and although it is rather late in his life, he gets just as much kick out of selling mikes as the average kid does out of standing on the street corner peddling his papers.

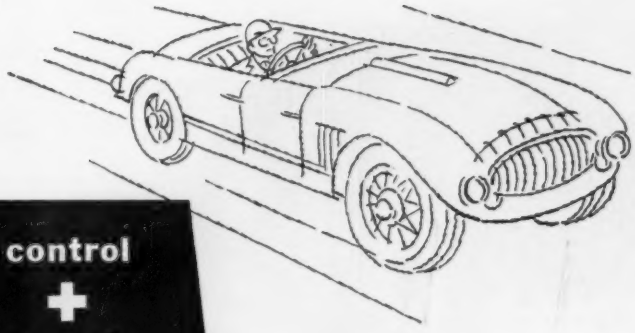
If we had a few more people of like caliber, probably we wouldn't have so many learners who clutter up our domestic economy with their upturned palms. When we consider the amount of time Jones takes to handle his little shop business, we'll have to admit that it is small in comparison with the amount of time he could spend yapping over non-essentials as is customary with lots of the time-killing yokels developing callouses on their butts. When he is selling mikes he's not killing time; he's making the most of it, albeit the impression might prevail that he's using up too much of the company's time in running his mike business.

If, perchance, some "small" local merchant hears of what is going on, he may think that he is justified in registering a complaint because he is being deprived of some business. Let him yap about it—who is he to think that he can have a monopoly on selling anything?

So long as Jones is on the up-and-up about his little business, I see no reason why he shouldn't be able to handle the selling of small tools. The amount of time he takes up should be considered in the light of the amount of benefit obtained.

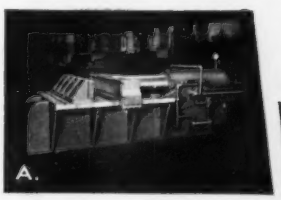
Jack Everett
San Francisco, Calif

THE PROBLEM OF aiding workmen to obtain good, first-quality precision tools is rather a tough one. If nothing is done, many workmen are apt to send away to cut-rate shops in other cities and end up with inferior tools;



control + speed

Hand-crafted sports cars are precision-built to hug the curves — take any road conditions — to provide the ultimate in control, speed and safety. Like these prima-donnas of the highways, BEATTY machines are constructed on precise tolerances to afford the same kind of exact control, speed and safety in industrial metal fabricating. One of the machines illustrated can be modified to suit your particular problem. Or, let our engineers recommend, design and build one to your exact requirements.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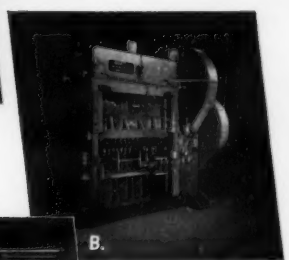
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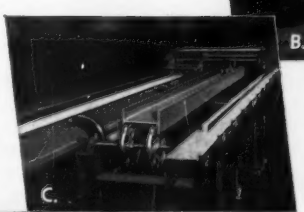

C.

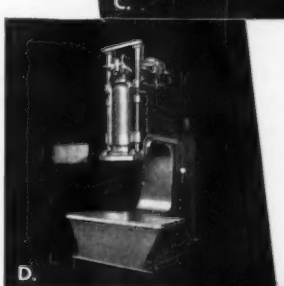
A. BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging and bending.

B. BEATTY Guillotine Beam Punch. Punches webs and flanges in "I" beams from 6 to 30 inches.

C. BEATTY Spacing Table handles web and flange punching without roll adjustment.

D. BEATTY Gap Type Press for forming, bending, flanging, pressing. Capacity 250 tons.

E. BEATTY Guillotine Bar Shear for angles, bars, rounds, squares without changing tools.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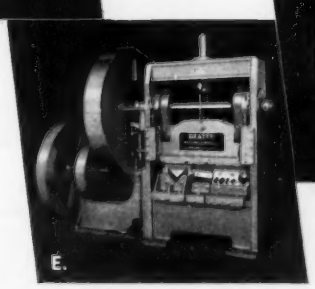
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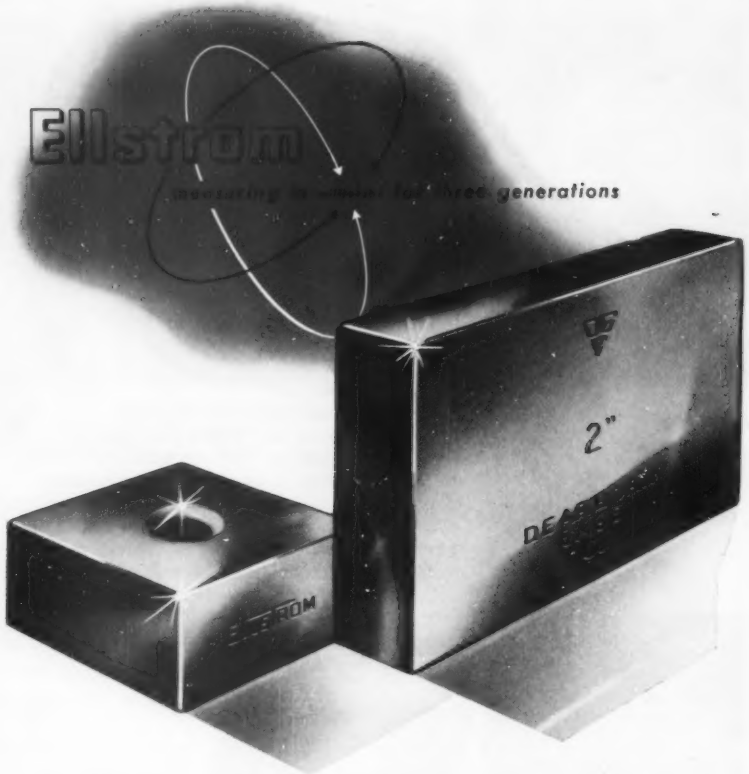
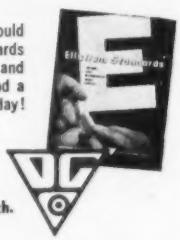


No finer GAGE BLOCKS at any price!

By any comparison you care to make . . . block-for-block, set for set . . . you'll find Ellstrom Chromium Plated Standards truly outstanding in the field of precision measurement. Materials used in their manufacture are precisely treated and thoroughly tested for coefficient of expansion, uniform hardness, and metallurgical stability. The durable chromium plated gaging surfaces are applied and finished by special Ellstrom methods which assure you of greater serviceability, longer wearing millionths. And flatness, parallelism, and specified accuracy of each individual block is fully certified by the most uncompromising final inspection found anywhere in the industry.

So next time you need gage blocks, specify Ellstrom Standards. Furnished in 28 basic sets, either square or rectangular styles, with block sizes in step series from .010" up to and including 20.000". Basic accessories also available . . . plus tungsten carbide wear blocks and individual blocks to meet your specific requirements.

IF YOU BUY GAGE BLOCKS, you should have this handy new Ellstrom Standards Catalog. Contains complete specifications and prices in convenient tabular form . . . and a copy is yours for the asking. Send for it today!



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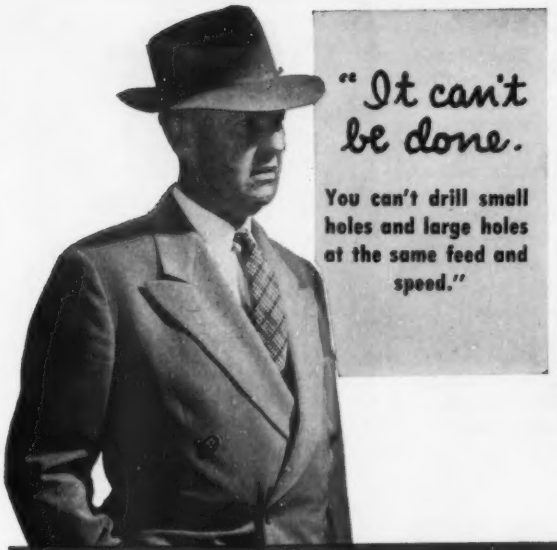
the accuracy of their work will probably be affected, or at least their rate of production will be slowed. Others will go to pawnshops which will generally lead to a similar result, for although the tools in this instance may be of reliable make, the previous owner may have abused or strained them, particularly micrometers and vernier gages. It is, therefore, apparent that it is to the advantage of the company to see to it that something is done to give the workman an opportunity to acquire reliable and accurate tools.

A very satisfactory solution to this problem is to invite several reliable manufacturers of fine precision tools to send copies of their catalogs and state the discount they will allow on quantity orders from employees. The catalogs can be placed in charge of the small-tools storekeeper, and loaned out on a three-day basis to workmen upon request, and one of the office clerks appointed to receive orders and cash for various tools as desired by the workman.

All orders are then accumulated, and a purchase order issued at the end of the month. The larger the order, the better the discount. When the shipment is received, the tools are distributed to the various purchasers and a cash refund made at the same time, according to the discount obtained for that particular shipment. The workman is pleased because not only has he received a finely made precision tool, but also a cash refund at the same time. The company, of course, is theoretically out the cost of the clerk's time, but since they have not had to hire an extra clerk for part time, the loss is just so much bookkeeping. Any expense is more than made up by more accurate and faster work accomplished with the best tools.

Al is quite right in his contention that practically giving Jones a fran-



"It can't be done.

You can't drill small holes and large holes at the same feed and speed."

"Well, let's see.

What do you pay off on? Feed? No! Speed? No! Production? YES!! —on your tooling cost and finished parts per hour."

DON'T YOU AGREE?

EXAMPLE (and it's extreme)

Drill stand has 30 holes 1/16" through 1/2" diameter. Completely drilled in two passes with two Zagar gearless drill heads, 16 spindles per head. All spindles run at 1200 r.p.m.

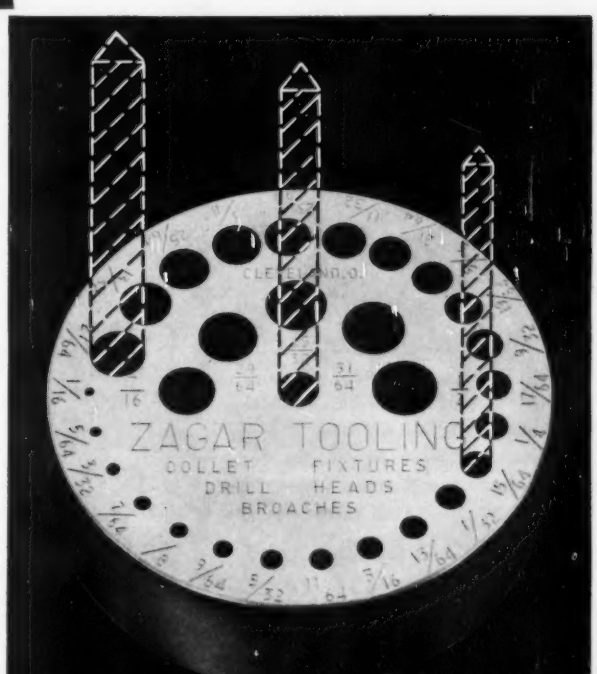
Conventional multi-speed method. So-called ideal speeds would be not less than three times as fast for the 1/16" drill as for the 1/2" drill. Ideal drill feed would be three times as heavy for the 1/2" as for the 1/16". Moreover, six passes would be necessary.

Zagar single-speed method. Only two passes. Feed is held down by strength of 1/16" drill, and speed is held down by 1/2" drill. Simplified operation; fewer indexes; far less handling. Production is at least tripled. Tooling costs drop enormously.

If you don't agree, what's your version?

★ ★ ★

WRITE FOR CATALOG "A-3"



One drill press with a 500-spindle Zagar drill head equals 500 drill presses. Get the full story of HOLES GALORE.

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Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

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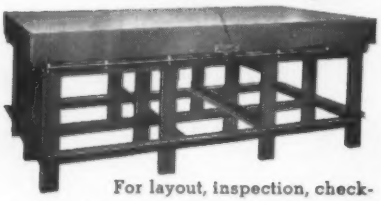
Challenge®



For layout, inspection, checking, lapping, assembly and welding operations . . . depend on the accuracy and stability of Challenge Precision Equipment. Mail coupon for information on Layout Surface Plates . . . Clamp Edge Layout Plates . . . Reading Tables . . . Lapping Plates . . . Welding Tables . . . Surface Plates . . . Bench Plates . . . Surface Plate Equipment.

Challenge Work Benches . . .

Four sizes. Cast iron top, two inches thick. Welded steel supports, tool box shelf, steel drawer with lock. ***Challenge Utility Benches*** — low cost.

Challenge

TRADE-MARK ®

THE CHALLENGE MACHINERY CO.
GRAND HAVEN, MICHIGAN

Send details as checked below:

☐ Layout Surface Plates ☐ Work Benches
☐ Surface Plate Equip. ☐ Utility Bench
☐ General Catalog ☐ Welding Tables

Name _____

Full Address _____

_____

chise to sell tools is not a good practice, and is expensive for the company at the same time. The method outlined above avoids any controversy among the men to the effect that Jones is delivering inferior products at too high a price, and also that he is receiving his wages as well as making a profit on the stuff he sells. When the orders are handled through the front office, and all the cost figures given with the refund, then there is little chance for any argument to develop, particularly if everything is done in writing, which should be insisted upon.

The companies who manufacture precision tools all send out fine specifications and clear illustrations. It is entirely unnecessary to have a salesman present, for the mechanic knows exactly what he wants and what he will get for his investment. Furthermore, he finishes up with tools that he can be proud to own and the work he produces with the aid of these precision tools should please Ed no end, and Al will have nothing to complain about either.

George P Pearce
Albuquerque, NM

THE SELLING OF tools in a shop on company time certainly appears to be a most inefficient way to accomplish the desired end. It is true that usually new employees need tools. It is also true that if the plant is some distance from the nearest store it is very difficult for the employee to get what he wants.

However, it has been the policy of many companies to frown upon in-plant sales by individuals on company time. The reason should be very obvious. In the first place, not only are you losing productive hours from the new employee, but also you

"Pss-st! That guy from the friendly loan company gone yet?"

"NO SHUT-DOWNS WITH LUBRIPLATE"

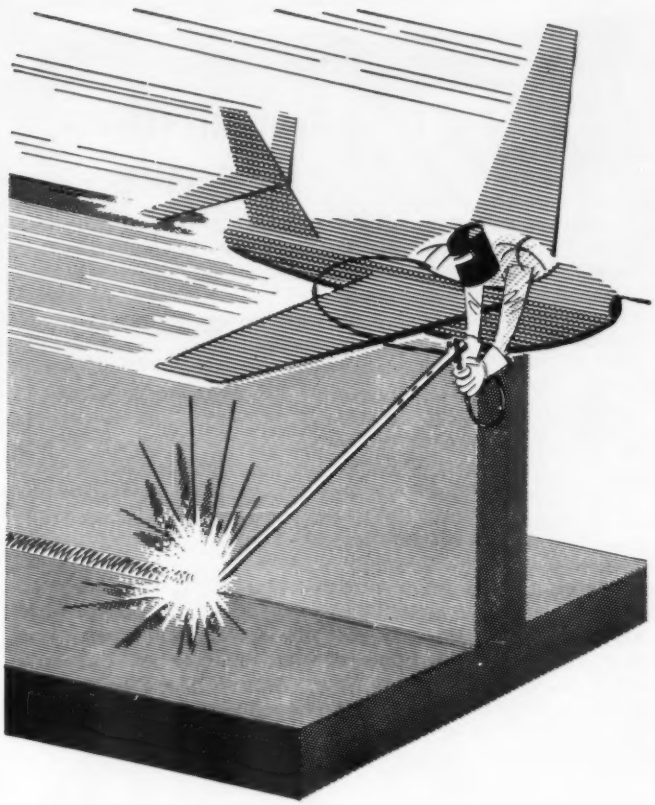
—say HENRY & WRIGHT
of Hartford, Conn.

"While waiting for delivery of one of our 25-ton Dieing Machines to do a particularly heavy job, a customer was trying to start production of a 10-ton machine. Even though it was lubricated with a conventional grease every eight minutes, the machine had to be shut down for bearings to cool during each coil run. Then, on our recommendation, he changed to a LUBRIPLATE Lubricant. With but two applications of LUBRIPLATE a day, the machine operated continuously except during change of coils."

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



LINCOLN JETWELD

NOW! 30% and faster welding speed to cut your welding costs..

FOR FILLET AND LAP WELDS

"JETWELD" (E-7020)

Designed for fast operation in flat and near-flat positions. Tensile strength (as welded) 80,000 to 90,000 psi. Yield strength (as welded) 65,000 to 75,000 psi. Elongation in 2 inches . . . 18-25%. For welding of mild steels. Equally good on low alloy steel and hard-to-weld steels.

"JETWELD" is ideally suited for welding higher carbon steels normally welded with low hydrogen electrodes. Also fulfills physical requirements of E-6012 and E-6013 electrodes in the flat position. For use with AC or DC.

HERALDS THE JET AGE IN WELDING TO MEET THE AGE OLD PROBLEM...COSTS

NOW, Lincoln joins *powdered metal* for the first time with commercial electrodes to utilize the heat of the arc more efficiently. As modern as the Jet itself, JETWELD achieves the fastest hand welding speeds ever accomplished . . . with new quality standards and ease of welding.

RESULTS

1. 30% and higher speeds on fillet and lap welds . . . and to new quality standards.

2. Easy to operate. A drag electrode, JETWELD has exceptionally stable arc characteristics. There is no coating breakdown. Stub losses are less.

Welders take to JETWELD'S smooth arc action . . . its improved resistance to arc blow. There is practically no spatter. Bead appearance compares with hidden-arc welds. Welds are self-cleaning.

3. X-ray quality—Weld metal made with JETWELD is uniform . . . of X-ray quality. It is free of undercut with improved impact values at low temperatures. JETWELD is used on higher-carbon steels normally welded with low hydrogen rods . . . without cracking and without surface holes. Bead shape is flat.

HORIZONTAL FILLET WELD. *Plate size is ⅜", fillet size 5/16", "JETWELD" electrode size ¼". Current is 360 amps, arc speed 14 inches per minute.*

START CUTTING COSTS

NOW Ask the shop that's using JETWELD today or order a trial lot of JETWELD. Immediate savings will be obvious. Procedures are in Bulletin 481. Write today.

Lincoln's leadership in arc welding is founded on one idea . . . to produce a better product at lowest cost through incentive operation.

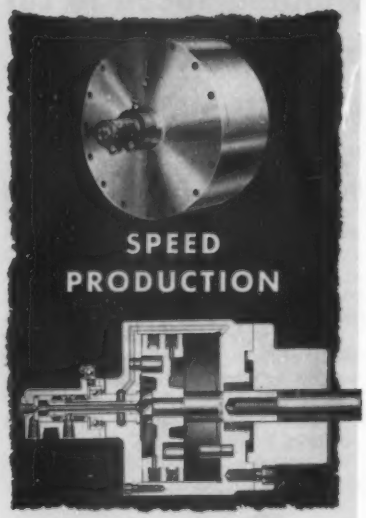
THE LINCOLN ELECTRIC COMPANY

Dept. 2001

CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

ROTATING AIR CYLINDERS



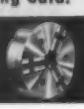
ELIMINATE DOWNTIME

Piston packings "replace" themselves by expansion from air pressure... practically eliminates repacking downtime. Aluminum or alloy iron housing. Non-adjustable, chevron-type rod packing. Long stroke. Balanced for high r.p.m.

Installed as original equipment by Bardons & Oliver, Cleveland Automatic, Cone Automatic, Monarch, National Acme, Warner & Swasey... and others.

Representatives in principal cities. Prompt deliveries. Send for S-P Catalog 101, containing full engineering data.

S-P POWER CHUCKS



Unique cam and lever design gives tighter grip, highest safety factor. Prompt deliveries. Send for Catalog 101.

OTHER S-P PRODUCTS: Parallel Grip Collet Chucks, Drill Press Chucks, Expanding Arbors, Blank Jaws, Hydraulic Cylinders, Air Cylinders, Air Valves, Air Pistons, Air Control Accessories.

THE S-P MFG. CORP.
ESTABLISHED 1916
12415 EUCLID AVENUE
CLEVELAND 6, OHIO
A Bassett Company

lose the time spent by the said seller.

Perhaps Ed's idea was to reduce the amount of production each day and develop gradually a retail store for the help.

Now one very easy way to accomplish the same end, if an employee is to handle the sale, would be to set him up in a nice, clean corner of the shop and between the hours of 12 and 1 o'clock let him make the sales. This certainly does not handicap anyone. An employee on the lunch hour will seldom use all 60 minutes of the hour to eat. Thus he has some free time to shop. This plan can work successfully. The problem is whether the salesman should be a company employee doing it on his own.

Some companies faced with this problem have asked that a salesman handling certain lines of products which range from the medium-priced to the expensive items, arrange to come in, say, three times a week at noon and at the changing of shifts. The results have been surprising—even the oldtimers have weakened and purchased new, modernized tools. Further, some companies make it a very easy matter to pay for the tools. They set up a charge-account system for their workers. In this manner the worker can buy in advance those things he needs, and the company withholds a certain percentage each week from the worker's pay.

These plans allow the worker to see what he is buying. Another idea which is frequently used in large companies where the purchasing power is greater, is that of allowing the employee to deal with the purchasing department. This method can be carried out in several ways. The one which seems more in keeping with the present-day high production trend is to let the worker requisition the tools needed and the purchasing department purchase a good quality tool for the worker. This has the added effect of keeping

"We give new employes too much "welcome" literature! He's been here two weeks and not one stitch of work!"

Concentration for Quality

Since 1919 Curtis has concentrated on the manufacture of only one line —

CURTIS UNIVERSAL JOINTS

As a result, Curtis research, production and quality control techniques have produced the widely accepted Curtis standards — and the world's best universal joints.

ONLY CURTIS OFFERS ALL THESE ADVANTAGES

Availability — 14 sizes always in stock; bored or unbored hubs. 6" hub diameter joints or special machining to specifications.

Simplicity—fewer parts, simpler construction.

Government Tests — complete equipment for government tests in our plant.

Not sold through distributors; write direct for free engineering data and price list.

CURTIS

TRADE MARK

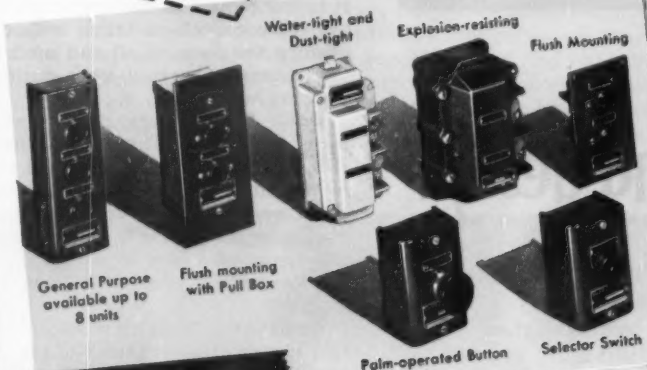
UNIVERSAL JOINT CO., INC.
6 BIRNIE AVENUE
SPRINGFIELD, MASS.

As near to you as your telephone

A MANUFACTURER OF UNIVERSAL JOINTS SINCE 1919

THIS COMPLETE LINE MEETS EVERY NEED FOR PUSHBUTTONS

STANDARD DUTY



HEAVY DUTY

Name your pushbutton requirement—there's a Square D unit to do the job, exactly. Three complete lines . . . standard duty, heavy duty, and oil-tight heavy duty . . . each providing a wide range of operators, stations, and circuit combinations.

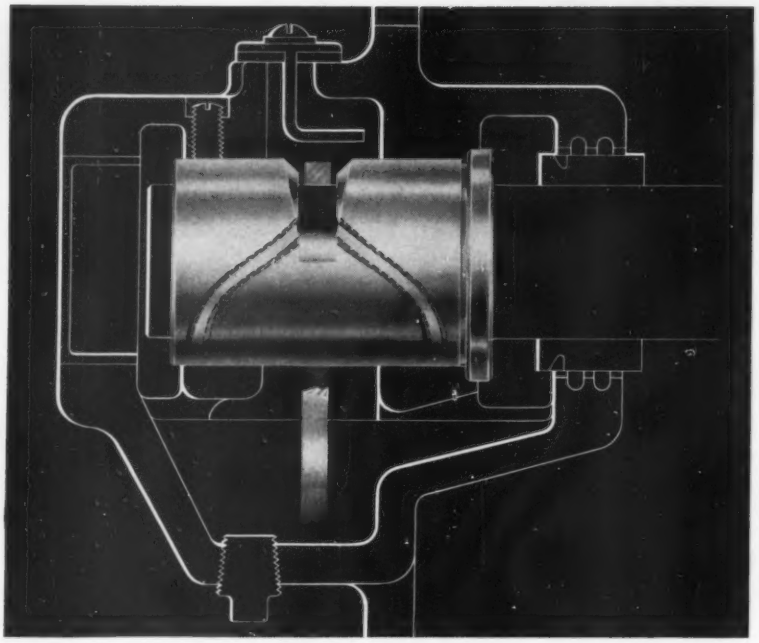
OIL-TIGHT HEAVY DUTY

Available in 1 to 16 unit sizes. 6-9-12-16 unit stations have hinged covers for easier wiring

Write for Pushbutton Bulletins which give complete details. Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

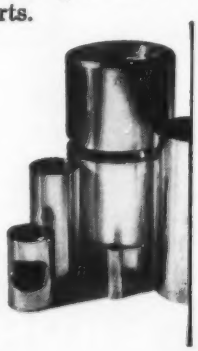


THE WAY TO CUT...

Cost of surrounding design

Although the sleeve bearing is longer than other types it is also much smaller in outside diameter. The weight of parts required to support bearings varies directly as the length of the bearing but it also varies directly as the *square* of the outside diameter of the bearing. Therefore the use of bearing types which are large in diameter and short in length frequently results in the use of surrounding parts which are unnecessarily heavy. Since unnecessary weight costs unnecessary dollars, consider the sleeve bearing not only for its own initial low cost but because of the possibility of reducing the weight and therefore the cost of the surrounding parts.

There is a Bunting Engineer near you. Consult him. Or send your inquiries direct to our Product Engineering Department at Toledo.



Bunting®

BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

The Bunting Brass & Bronze Company • Toledo 1, Ohio

Branches in Principal Cities • Distributors Everywhere

good tools in use within the plant. It tends to give better quality to the product. Good work can be done only with good tools. Usually under this plan the employee gets the company discount or some portion of it. Sometimes this discount is used in part to help defray the expenses of the plan.

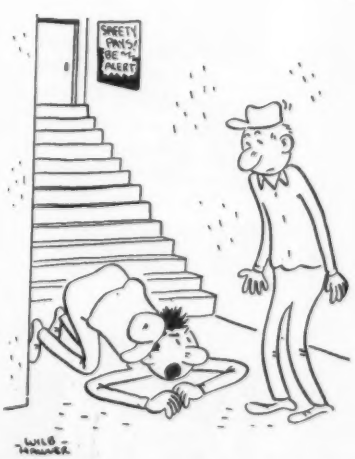
In each instance we find that the same desired end has been reached. Yet in all of the suggested plans no loss of time is noticeable. If you allow an employee to sell on company time to other employees, watch how the time of non-production suddenly goes up. Frequently instead of having one customer, the seller has four or five on-lookers or window-shoppers. Where is your production? It will slip even lower if this plan goes on. Tomorrow another employee will have something to sell; that, too, will be at the expense of production.

It is never wise to allow an individual to sell anything on company time. It is bad enough to have certain unavoidable collections taken without opening the doors to all and sundry and becoming a retail store during working hours.

Think twice before placing any plans into effect. Think what they will accomplish, and if they will tie in to company policy, and what the effect on production will be. It is always better to lose a few productive hours of a new employee than to lose many hours of several workers.

We have not discussed monopoly of this idea because it seems to me to be not worthy of consideration. Frankly, there could be no monopoly because others would force their way in.

Charles D Townsend
West Hartford, Conn



"I was looking back, trying to read the safety poster . . ."

How to produce more at less cost ...increase profits!

Alemite methods of transferring lubricant to bucket pumps proved 63% faster by actual on-the-job time study!

An important saving in transferring lubricant—but even more important than the man-hours saved are the *machine*-hours saved—the costly repairs that don't have to be made, the increased bearing life. And the reason for these savings is that only "refinery clean" lubricants reach bearings—machines operate at peak efficiency longer—unit costs go *down!*

Alemite transfer pumps fit directly into refinery drums, fill a portable bucket pump in *less than a minute* with no air pockets, no spillage, mess or waste. Then, the large capacity of the bucket pump allows servicing of hundreds of bearings without stopping for refilling.

There is an Alemite transfer pump and bucket pump combination just right for your plant, big or small. Transfer pumps are available for 100 and 400 pound drums, all types of lubricant. And you will find a bucket pump to service any machine—to handle lubricants from the lightest oils to heaviest, high pressure greases. Wide range of capacities, developing pressures as high as 15,000 psi. All of them are tightly sealed—preventing contamination, reducing fire hazards.

With Alemite Plan "B" Only Refinery Clean Lubricant Reaches Machines

A 400 pound barrel of lubricant arrives at the plant oil room—sealed, fresh, "refinery clean."

An Alemite transfer pump is inserted in the bung-hole. It is threaded to fit and seal standard refinery bungs.

In less than a minute a twenty-five pound capacity bucket pump is filled with lubricant—free of contamination—no air pockets—no mess!

Now the bucket pump is ready to service hundreds of bearings without refilling—supplying lubricant that has been protected all the way from barrel to bearing!

This combination of transfer pumps and bucket pumps is known as Alemite Plan "B." It is one of the five Alemite plans that your trained Alemite representative can show you. Ask him about the colorful, new, informative slide film, "No Margin for Error," which will help you and your men cut production costs. No obligation, of course.

ALEMITE
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A PRODUCT OF SW STEWART WARNER

Ask Anyone in Industry

Free! **New Booklet "5 Plans for Better Plant Lubrication"**

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Please send me my copy of
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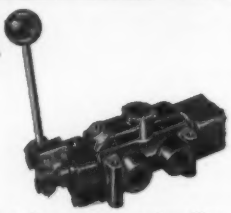
ADEL *Industrial Hydraulic Equipment*

for PEAK PERFORMANCE ADEL Hydraulic Valves and Pumps are setting new and ever higher standards for precision in manufacturing and efficient performance in operation. Following are but a few of the wide variety of models to meet all operating conditions.

GEAR-TYPE HYDRAULIC PUMPS

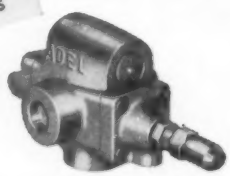
For 1000 psi service with rated capacities at 1800 rpm of from 1.5 to 46.8 gpm.

DIRECTIONAL CONTROL VALVES



4-way valves with spring-centered, spring-offset, and 1, 2, or 3 position detent action. 1500 psi. Flows to 28 gpm.

BY-PASS VALVES



Relief, Sequence and Unloading valves. Direct or remote operation, 50 to 1500 psi range.

VOLUME (FLOW) CONTROL VALVES

Compensated type maintains constant flow over wide differential pressure range. No drain line required. 1500 psi.

PILOT VALVES

2 or 3 position detent. With or without dog or lever. Can be used as 4-way valve in small circuits. 1000 psi.

CHECK VALVES

Valves allow free flow in one direction only. Many variations available. 3000 psi.

A FEW SELECT TERRITORIES ARE STILL AVAILABLE TO PROGRESSIVE DISTRIBUTORS OF HYDRAULIC EQUIPMENT. INQUIRIES INVITED.

For complete engineering specifications and counsel, Address: ADEL DIVISION—GENERAL METALS CORPORATION, 10767 Van Owen Street, Burbank, California.

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Manufacturers of Industrial Hydraulic Valves and Pumps

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MY DEAR OLD TRUSTED FRIEND Ed, who has shown to all of us in the past few years that you are a square-shooter, don't you think you are sticking your neck out in permitting such a practice in your shop? To let an individual have the privilege of selling tools to his fellow workers may seem like a trifling variation to some people, but shall we place the cards on the table and turn them face up? Ah, we have four aces! What are they?

(1) Why should it be necessary to have to sell tools in the shop when almost every first-class hardware store has a good stock of them on hand?

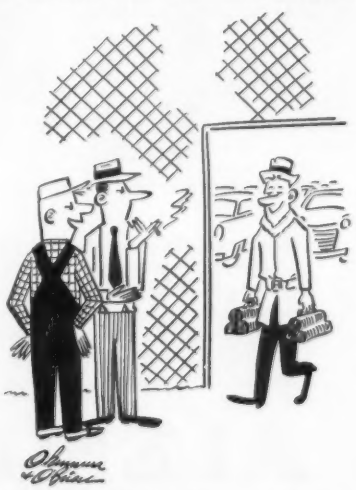
(2) If it is, why give one man the chance to make some extra cash when there are other poor suckers struggling to make ends meet?

(3) How much of a rakeoff is the foreman getting out of the deal?

(4) Why isn't it to the company's interest to purchase necessary tools for its employees?

Assuming that it is very difficult for a worker to find the time to buy his tools in the customary manner, is it right to have any individual assuming that responsibility? With such an arrangement he is certain to use up quite a bit of valuable time that is rightfully the company's. In permitting an employee to do this, there is danger that he will become imbued with the desire to skim a little cream off the top and the first thing you know he is securing his tools from questionable sources with the result that quality begins to diminish. The first thing you know, the purchaser will register a justifiable complaint and the long, time-consuming argument ensues.

The selling of micrometers, and other tools vital to the interest of the



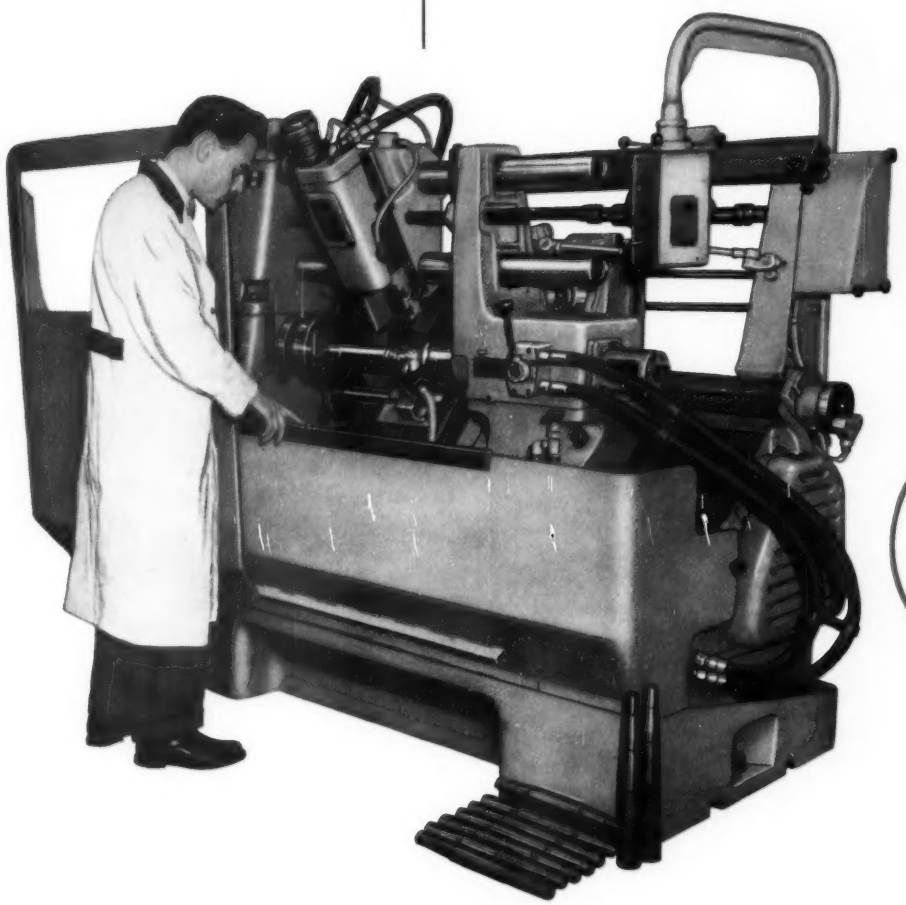
"Forgot his lunch yesterday . . . so he's making up for it!"

Introducing the new American built...

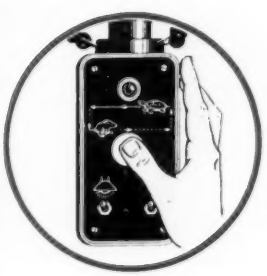
PILOT

COMPLETELY AUTOMATIC

high speed **HYDRAULIC COPYING LATHE**



See its amazing speed at the **A.S.T.E. EXPOSITION** *in* **PHILADELPHIA,** *April 26-30, Booth 509*



Now completely built in the United States to JIC standards by Industrial Metal Products Corporation, Lansing, Michigan.

Turn the page to see the Pilot's outstanding features

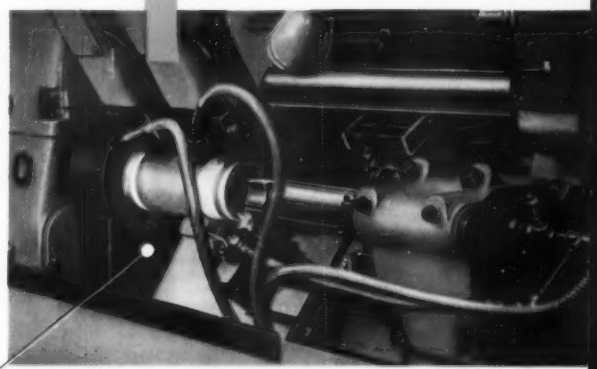
Throughout the world...

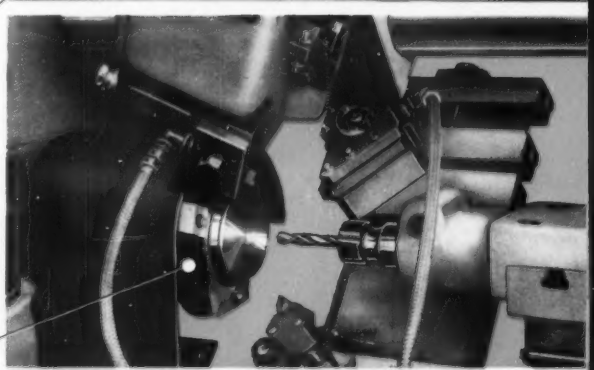
Progressive plants that demand the best say H.E.B. is "the way to turn"

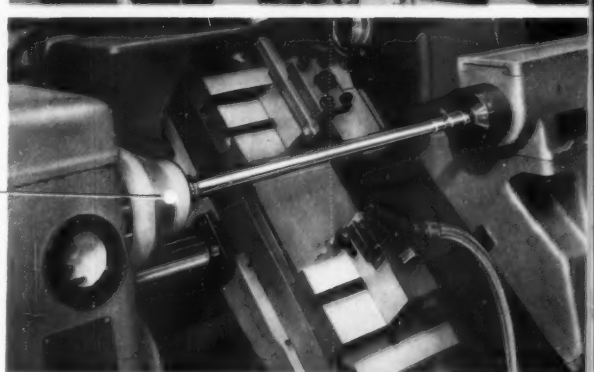
See the H.E.B. Pilot in action at the A.S.T.E. Exposition in Philadelphia, April 26-30, Booth 509

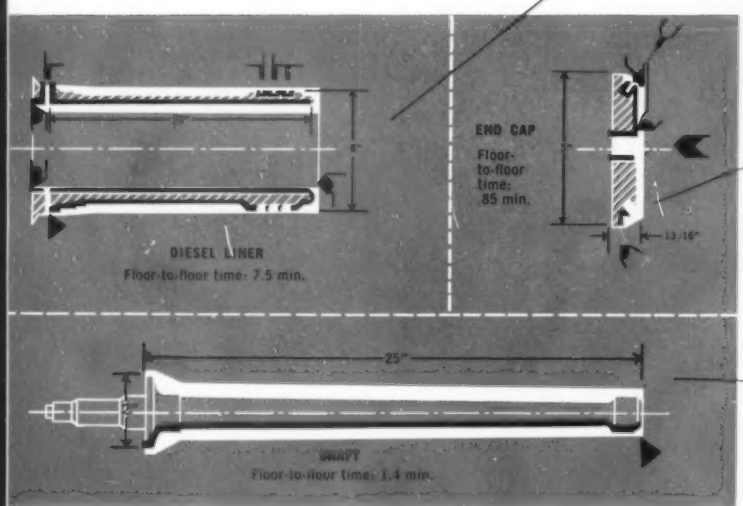
CHECK THESE REASONS WHY:

- Completely automatic; operator only loads.
- Motors up to 60 HP; spindle speeds 380 to 3000 RPM.
- Standard power operated back tools can be used for copy turning, finishing or undercuts.
- Takes as many as eight different cuts in one cycle if necessary.
- Patented hydraulic carriage feed easily adjusted and vibration-free. Once set, remains absolutely constant.
- Accuracy of .0005" and 32 micro-inch finish obtainable.
- Hydraulically powered infeed slides available.
- Adequate coolant supply built into toolblock.
- Splash guard mounted on rollers.
- Fewer tools necessary, resulting in less down-time.
- Twin cross slides, infinitely variable spindle speeds for constant cutting speed available.









H.E.B. Hydraulic Copying Lathes are also manufactured in OP Models with 20 HP motor; take heavy cuts with carbide tools at spindle speeds 50 to 3600 RPM, economical for short runs . . . And in GT Models with rotating pattern designed to copy an infinite variety of non-circular work.

The new, fully automatic H.E.B. Pilot is a triumph of production engineering—culmination of years of brilliant research by H.E.B., specialists in lathe manufacture and pioneers in the field of copy turning.

H·E·B
"THE WAY TO TURN"

H.E.B. MACHINE TOOLS, INC.
475 Fifth Avenue, New York 17, N. Y. • LExington 2-0266

COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • CARBIDE TOOL GRINDERS • RADIAL DRILLS

worker, can be the beginning of a shop gradually turning into a market-place where everything from scales to clocks is being vended by the experimental merchants eager to make an extra buck or two so as to be able to make his payments on the new "Roadrunner" on time. Perchance he may have a wider vision, and is looking forward to retiring from the atmosphere of lard oil and cutting compound.

This idea of permitting an employee to sell a few knick-knacks sometimes springs from the brilliant mind of a smooth-thinking executive who thinks that a man able to sell something is doing it in order to augment his earnings as an employee. The story goes—and I don't doubt the source of my information—that one executive of my acquaintance made the crack that it wasn't necessary to pay high wages because he felt that the workers could settle down on a small piece of land, not far from the shop, and raise chickens, rabbits, and a yard of vegetables which they could sell around town. It was no unusual sight to see these "well-paid" employees go around among their fellow workers and take orders and, sure enough, the results would be delivered the next day or two. Some sold chickens; some rabbits; and some knocked off a cent or two beneath market price in order to dispose of their eggs. What pretty nearly killed me was to see a fellow deliver a quart of goat's milk!

Outside of giving an individual a little incentive in merchandising, and giving the other fellows a good chance to kill some time while dickering over prices, the scheme was not so bad. However, the practice of turning a manufacturing plant into a market-place is to be shunned by all business-thinking individuals. If we confine our discussion to the mike dispenser let us consider some of the more ethical alternatives.

When a man applies for a job isn't it assumed that he will have the necessary tools to do that job? Why should he have to wait until he starts in on a job and then buy a mike from a trusted employee who has been given the job of selling them? If a man finds it inconvenient to visit a place where they sell such things, then something will have to be done so that he can secure them.

The subject of purchasing tools and necessary equipment has been one of my pet brain storms. I have always felt that the manufacturer should, in addition to paying a suitable wage, do whatever he could to make these wages stretch as far

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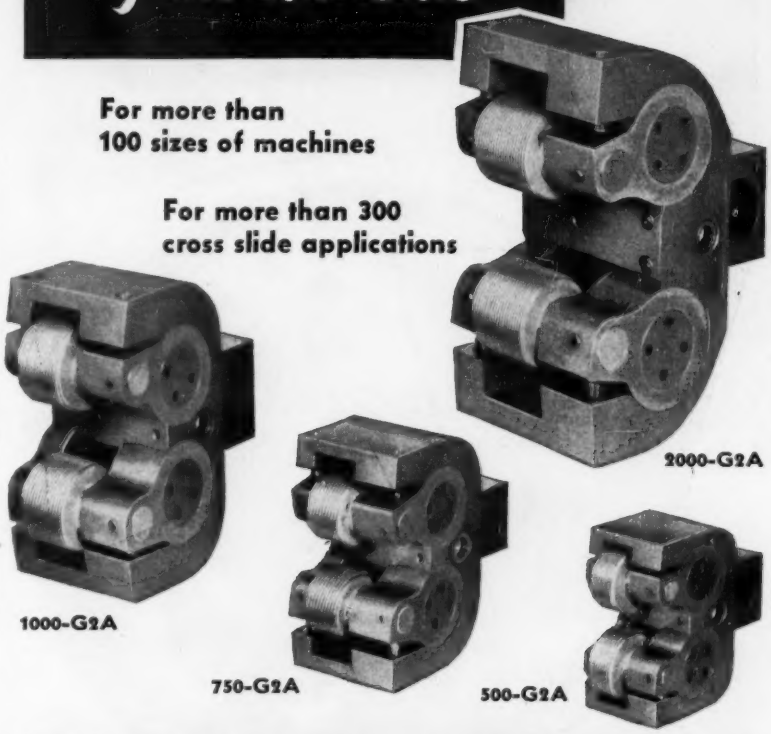

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as possible. One of the ways of doing this is to enable the employees to buy through the firm's purchasing department wherein they will gain the advantage of the discount usually given to the firm. This may seem like adding tedious details to the firm's business, but what is more important to the firm than to have its employees happy, and able to live as they should, and not held up by every Simon Legree in the retail business. Protect the interest of your employees, Mr Employer, and you can bet on it that they will protect yours.

J Homewood
Tujunga, Calif

•

TOO OLD TO LEARN

Is there a specific age at which a worker is "too old to learn," or isn't it rather a mental state, occurring at at any age? Who is to decide when the point has been reached?

THE ASSERTION that a man gets too old to learn is one of those general statements about humanity, supported by old proverbs, but is based on fallacy. A man's speed of learning is impaired with age, but there seems to be no limit to the power of the human brain to absorb new knowledge at any age. What is important is the presence of the will to learn, and an absorbing interest in the subject chosen for study.

The idea of deciding to disturb the peace of mind of a foreman by suddenly demanding that he proceed to absorb new knowledge, after he has drifted along for about 20 years without extra mental effort, is doomed to failure from the start. A conflict will be created in the mind of the foreman and he will be mentally paralyzed by the new demands made on him. Any way you look at it, the sudden shock to an organization whose executives are asked, overnight, to go back to school, will have violent and unpleasant repercussions; a lot of unrest will be created.

Engineering education must be a gradual and continuous process. Executives who wish to increase the technical knowledge of foremen and the like must settle down to the hard work of first implanting in the minds of workmen the need for higher technical knowledge. The actual acquisition of the knowledge can be carried out by any of the well-established methods, but the thirst for knowledge must be present before deciding what is to be drunk.

It is well known that top-rank designers in the engineering trade

never stop learning. We have the situation where the chief designer in an aircraft firm has remained chief for over 20 years and has kept himself ahead of the technical demands of bi-planes, all the way through to supersonic jets and helicopters. The main reasons why men, like aircraft designers, remain at the forefront of their professions is due to the necessity of acquiring knowledge continuously.

There is no reason why this continuous learning process should not become standard practice in any manufacturing plant, but the necessity for increasing knowledge and the acquisition and application of it must be emphasized and encouraged by management. If management is not interested in acquiring new knowledge, then the employees cannot be expected to be enthusiastic. This requires that top executives lead the way by attending meetings of learned societies, contributing to management conferences, and insuring that the rank and file of the staff are given time off to follow suit.

It was once said that every worker gained his technical knowledge and skills at the expense of his employers; managements have accepted this as an unavoidable expense; they must also be ready to accept the expense of increasing the technical knowledge of their workers by allowing them to go outside the plant and see what other people are doing to increase productivity.

The only situation which could arise that required a foreman to start learning again would be a change of management. The new management decides on a progressive policy of all-around educational uplift, but it is no good deciding that some men shall be left out of the scheme because of their gray heads. If education is to be the future policy, all minor executives must be invited to

"Fenwick, how come you never have to wash up?"

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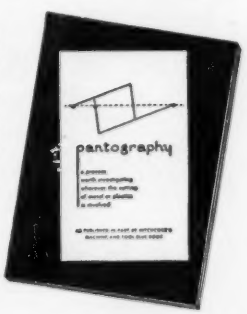

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participate. Initially, the scheme may take a bit of selling, but I would be very much surprised if the opportunity for increased knowledge was rejected by any man.

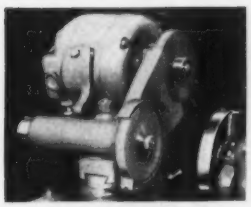
The older man can be persuaded to take an interest in higher education if the attendance at a conference, meeting, film, or other shindig were sugar-coated by converting it into a pleasurable experience instead of an unpleasant chore imposed by the employer.

A progressive policy of keeping up-to-date with new ideas must be enforced by top management and spread therefrom throughout the whole working force; you cannot have parts of a firm running in advance of the rest, technically, because the new ideas have to be carried out in practical form in a willing manner by somebody, no matter how lowly his job.

Clifford T Bower
London, England

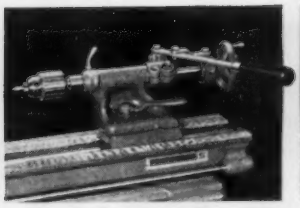
Is ANYONE TOO OLD to learn? Industry has exploded this myth. All workers, from laborer to manager, are subject to being moved from one task to another. The productivity of the worker increases from year to year. Quality improves. Costs are reduced. Processing cycles are cut. More goods are produced for more people at less cost. As time marches on, industry forges ahead. New skills are developed. Men learn how to operate more complicated machines. The effect cannot be greater than the cause. If industry has become more efficient, if workers have become better workers, it follows that foremen have learned how to become better bosses. Many of these foremen who have learned have been 45 years of age or older.

"Recall about a year ago when I started this order preference system . . . well today I'm proud to say all our orders are special handling!"

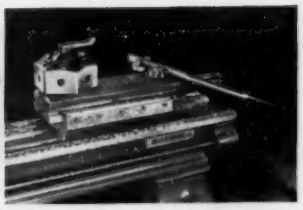


External Grinder

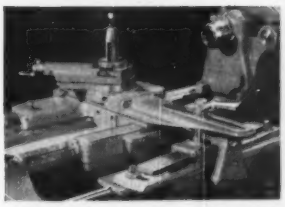
Milling Attachment



Handlever Tailstock



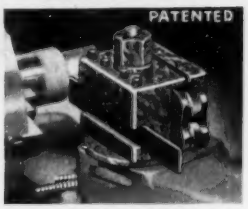
Handlever Bed Turret



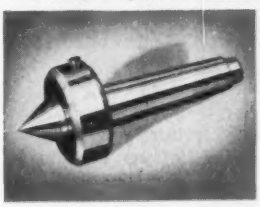
Telescopic Taper Attachment

Handwheel Collet Attachment

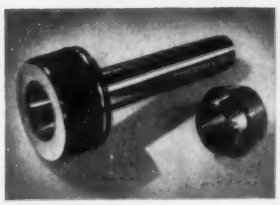
Handlever Collet Attachment



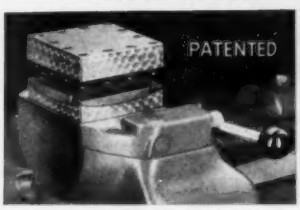
10 in 1 Tool Holder



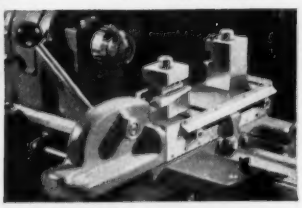
Ball Bearing Live Center



Adjustable Collet Bushing Chuck

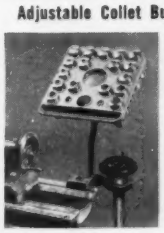


Square Turret Tool Block

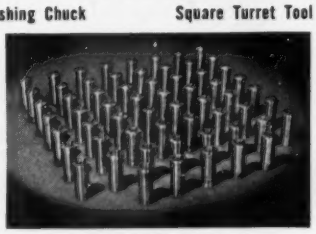


Handlever Double Tool Cross Slide

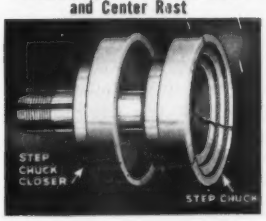
Telescoping Jaw Follower Rest and Center Rest



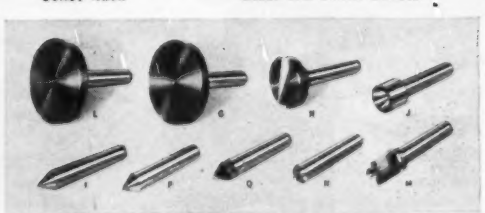
Collet Rack



Steel and Brass Collets

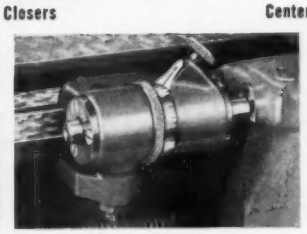


Step Chucks and Closers

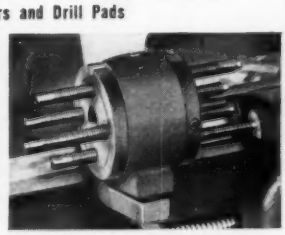


Centers and Drill Pads

Thread Dial Indicator



Micrometer Carriage Stop



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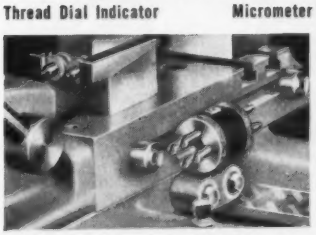
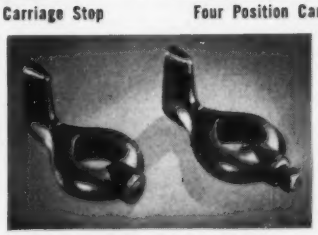


Four Position Cross Slide Stop



Safety and Standard Lathe Dogs

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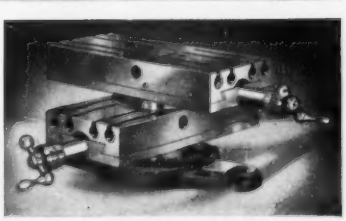

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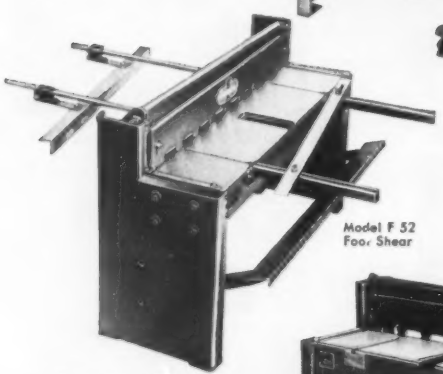

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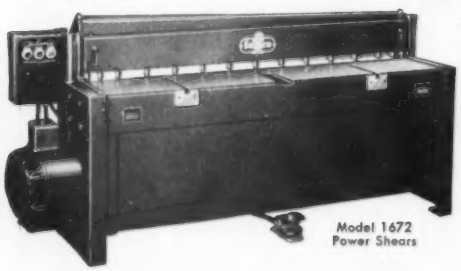

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To learn is to gain knowledge or understanding. The capacity to learn has always been a basic requirement of the foreman's job. One with the ability to absorb knowledge has an inherent desire to use this talent. The foreman's job offers such an opportunity. Learning becomes a habit, a habit which is not related to one's age.

Research has discovered that man best gains the knowledge to develop his art and his skill between his 20th and 40th birthday. He best gains the understanding to develop his qualities for leadership after his 40th year. Man acquires wisdom with age. The management of many of our most successful corporations now consider leadership ability to be the most important quality in foremanship. It thus appears that the most opportune time for a foreman to learn is after his 40th year.

Since there is a difference between learning and education, one may ask, "Can the old-line foreman get education?" Not as a rule, is our answer. He doesn't need it. Education is the discipline of mind or character through study or instruction. Experience has been a good instructor to the old-line foreman. He has gained understanding and wisdom from his dealings with men. Many an old-line foreman with an inherent respect for the dignity of man and of labor has developed within himself a keen mind and a sterling character. Young foremen are inclined to be smart, intelligent, clever, sharp, ambitious and hustlers. The older foremen tend to be patient, persistent, understanding, content with their lot, and considerate of the feelings of others. One is a leader, the other hopes to be. One needs education, the other has it.

Old Man Johnson may have more wisdom than Harrison. He probably

"Great work, Johnson! You turned out a whole week's production last month!"

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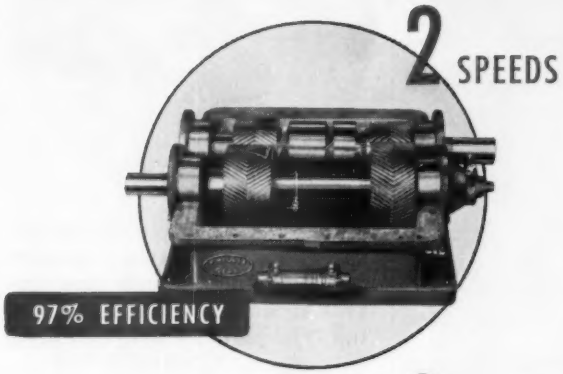

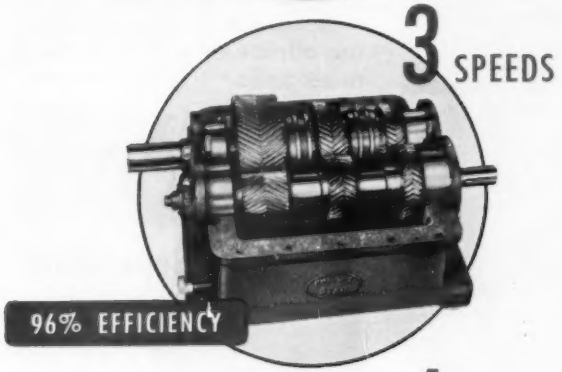

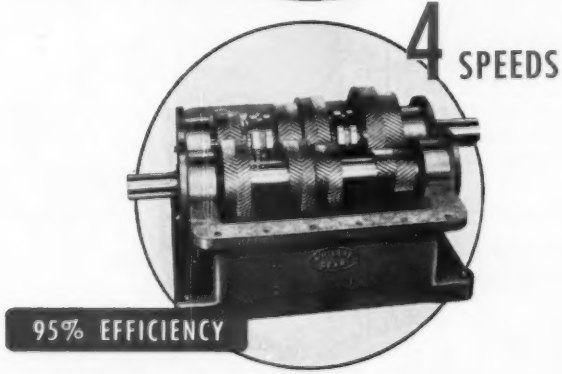

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has a higher opinion of his foremen than Ed suspects. Johnson may think that Ed is too good, not too old, to be subject to college instruction. An old shop man realizes that a keen blade can be dulled by just a little more inexperienced filing. More than one institution of higher learning has been accused of being in business to train men, not to educate them. Workers and their supervisors have kept pace with the demands of industry. The old-line foreman has not been out of step.

Peter A Seward
Swampscott, Mass

PERHAPS THERE ARE two sides to this question. One might be why some of the older men were not interested in learning. The other, that the company has decided that men over 45 have lost their usefulness and are short-sighted enough to slap them down.

Suppose we analyze the problem in order that the background of education and the desire to learn are brought to the fore. From the first day of school there are individuals who do not like to learn. The make-up of these persons is such they decide that education is a waste of time, that experience and the school of hard knocks is the answer to any success. So as they grow older and obtain recognition during the years of their efforts, they become more set in their way of thinking. When opportunity knocks for them to advance, many times they do not recognize the knock. Sometimes they do achieve a high goal, but as the years of industrial management and growth of our industrial world progress, they become afraid and try to hold back. They dictate policy, when they are in a position to do so; that is backward—or at least not progressive. In

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their desire to hand down decisions, and hang on, they many times carry hundreds of other workers to their doom. Companies have been forced into bankruptcies by men who are shortsighted and refused to learn.

We can recognize that Johnson has personally reached this point in life. He is afraid men over 45 will become too progressive if they learn about new ideas. Perhaps they, upon reaching the age of 46, 47, or 48, might force his retirement due to more productive management thinking. A sad outlook, but true.

On the other hand, we have individuals who like to study, and regardless of age, are constantly learning about new ideas. These men will naturally seek out the information no matter how it is presented. Yet many times a foreman does not have the wherewithal to get the basic information that he really needs. Therefore, the idea of supervisory training courses at a State University is a wonderful solution. Here these men have an opportunity to accomplish two things. They have the chance to absorb the new thinking of men not closely allied to their own problems. They meet other foremen in other industries and find that their problems are similar in nature. The friendship that frequently grows out of such programs can often put the company into a better productive position.

The older foremen—the men over 45—have much to contribute to the younger group. They can learn, also, from the ideas that the younger group have tried and made successful. Many things tried two or three years ago can now be made to work successfully. No one is ever too old to learn unless he does not want to learn. Then it is not age, but a mental block placed in the individual's mind by himself.

Why should a company decide that foremen or supervisors over 45 should not attend a supervisor's course? Unfortunately, for many years some of our industrial concerns seem to have got in to the habit of thinking of age only in terms of years, not of knowledge. They set up age groups and say, "All right, when you are 45, your usefulness is gone; we don't want to use you any longer." What a warped sense of thinking. A man or woman reaching the age of 45 is now in the prime of life. Experience and education have been blended together to the point where they are just beginning to become useful to a company.

Age means little with regard to industrial usefulness in supervisory positions. More emphasis should be

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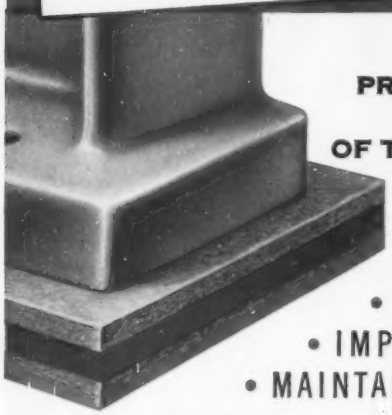

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placed on actual knowledge and broadness of background than upon age. The younger group can perhaps weather some of the industrial strife better than an older group. However, to offset this, the older group knows better how to cope with conditions.

When will companies wake up and recognize that it is the individual, not the age, that should be the advancement point of consideration. Many of the younger group have no more desire to learn than some of the older group. Sure, the younger group perhaps makes more noise, and probably hoodwinks the company better than those over 45, but certainly this doesn't mean that they are better supervisors.

If perhaps we should say that top management of our companies is too old to manage, if they are executives beyond the age of 45, then few if any of our companies would exist today. Let us wake up both large and small companies to the fact that an individual is a person from 9 to 90 and that he can learn at any age, if he so desires. It is the companies' responsibility to have only supervisors who want to learn. Then we will begin a new era of usefulness, less bankruptcies and/or more growth.

Charles D Townsend
West Hartford, Conn

AS A GENERAL RULE, one's age does mean something when it comes to his ability to learn. Why this is, I am unable to determine. It may be that the older person is more set in his ways, allowing the certainties of past experience to override the possibilities of untried ideas, or it may be because of physical retardation caused by some mysterious aging process of the lubricant of the thought-motor's mechanism.

If I may be forgiven for bringing my personal problems before you, I'd like to point out that I find it

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harder to memorize now than when I was a young squirt. A peculiar thing about it is that when I do manage to store something away in the subconscious, it is there for keeps. I retain it better because I worked harder to memorize it. Several years ago I checked up on myself to see if I could still memorize poetry and finally managed to handle one of Bryant's best—"To A Waterfowl." I thought I never would accomplish it, but it is now a part of me and I couldn't forget it if I tried. There may be some law in connection with this to the effect that the amount of effort necessary is commensurate with the period of retention.

Now learning is not dependent entirely upon memorizing. The acumen with which one grasps ideas is a vital part of the effectiveness of one's ability to learn; however, memorizing is a valuable trait toward its accomplishment. As a kid in the fifth grade, I learned eight lines of a poem which I was to recite at an entertainment given around holiday time. Those lines impressed themselves on my mind in very quick time, but when the moment came to recite them, I stood before the assemblage, in my new trousers hacked out a pair of Dad's old ones, and after perfect delivery of the first two, I was stuck in a mental vacuum. I bring this to light to point out that absorption and retention are possibly related to each other in somewhat the same way as stress and strain in Hooke's law of material structure.

I find the same thing applies to my reading. This all comes under the heading of ability to learn—that is, the comparable ability of old and young. It so happens that I am one of those bulldozer readers who reads by word, whereas there are some who read by sentences or paragraphs. A chap of my acquaintance tells me

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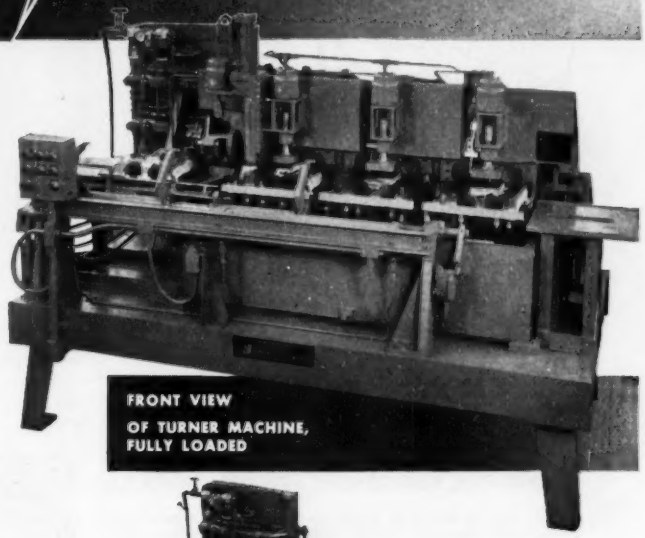

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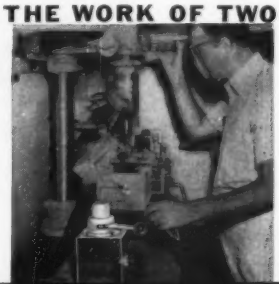

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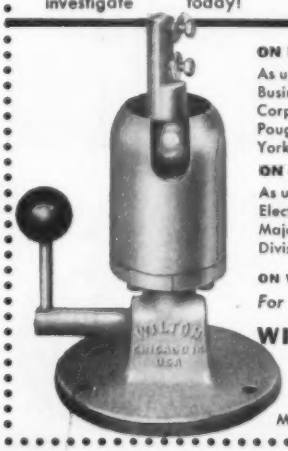

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that he reads by page; I don't doubt his word at all, as these times are certainly wonderful as far as progress is concerned. No doubt some product of the atomic age will be able to look at the cover of a book and tell what is in it. Fortunately, at times, I find no retardation in my reading ability, but at my age I do frown a little in order to get the meaning. Like Ed, I compare what I am reading with that which I had experienced in the past, and, as a consequence, am held up for a spell to get things straightened in my mind before continuing.

Can it be that Ed—I'm assuming that the illustration on the "Too Old to Learn" Round Table page depicts Ed in class—is going through one of those reflecting trances peculiar to old age wherein he also is comparing the new presentation with a workable one in which he has had complete success in the past?

A younger man takes to new ideas as a blotter takes to the surplus ink, whereas an older man weighs the values in comparison with that which he knows is effective. The young squirt travels along the freeway mind with no interfering intersections or boulevard stops, whereas old Ed puts on the brakes occasionally and says to himself: "Horsefeathers! This highbrow doesn't know what he is talking about; why, back at the old Lefthand Corkscrew Company I did the same thing. . . ."

It may be that this mulling over in the mind—this value-finding cogitation of the older student—is looked upon by the abstractionist as being learning difficulties of the older student. Nevertheless, we oldsters will have to take off our hats to the younger element and admit that they are more adaptable to new ideas.

To cite another instance of the relative learning ability of the old and young, may I say that I have been looking at automobiles ever since the first "horseless carriage" made its appearance outside of our little red schoolhouse more than a half century ago. I can sit on the porch beside my grandson as the cars speed by today and name off a few of them such as a Ford, a Chevvy, or a Buick, and if a steam roller should happen along I could name it with unfailing accuracy but "Red," my freckle-faced offspring of ten years, could name them off with such speed and precision as to make me blush in shame.

Can it be that we old fellows are inclined to be too satisfied with things as they are, and hesitate to put ourselves out to learn better ways of doing things? I can't help reverting to the illustration of old Ed again

wherein he seems to be saying to himself: "What's the use of bothering over a thing like that? Why hell, we've been doing the same thing on an old Sebastian for years and nobody complains." Ed must be letting that which he has been doing so successfully interfere with that which he could do far better were he to pull up anchor and head out to the sea for progress.

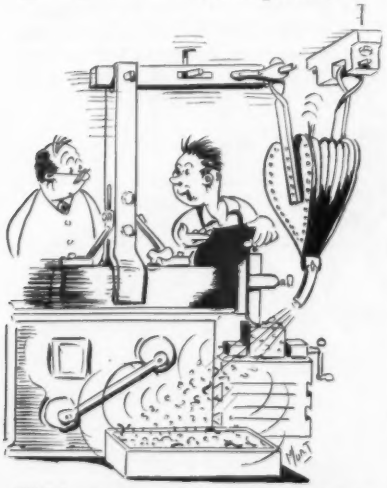
Now comes the payoff! Are these sentiments expressive of general consensus or is it just my own reaction because I can hear the faint notes of "Taps" coming over the distant hills to the West?

John Homewood
Tujunga, Calif

I READ YOUR Round Table discussion "Too Old To Learn" with great interest. A recent management shift brought home to our organization the importance of employee training. A practical, workable, training program on all levels is essential to the future growth and success of an organization. A training program is comparable to a sinking fund established for the purpose of replacing machinery as it is retired from service.

There is some question among members of the teaching profession as to the variation of learning ability with age. However this is only a quantitative question. What difference does it make if the older men are a little slower; they definitely are capable of learning and becoming more valuable to the company. Learning is an acquired process; people learn how to learn, and people also forget how to learn.

Learning is the most universal and one of the most important oc-



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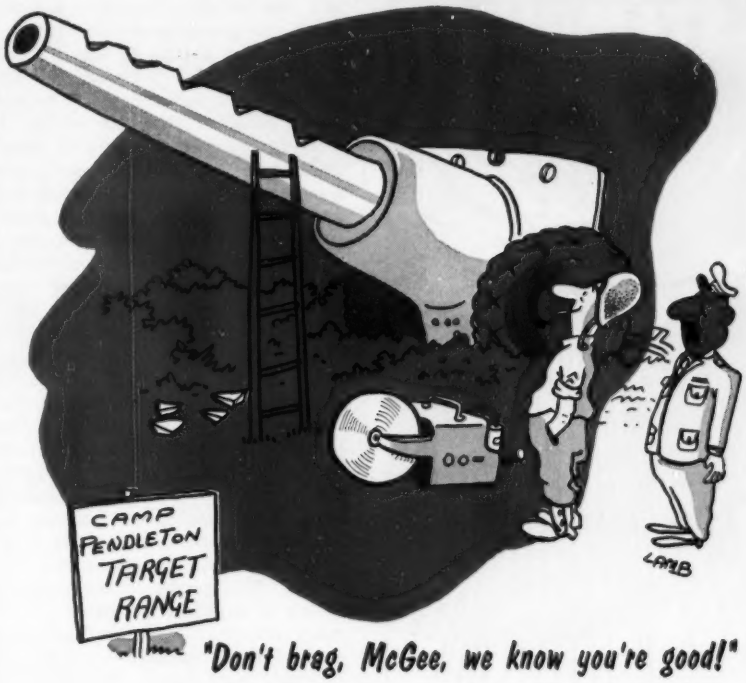

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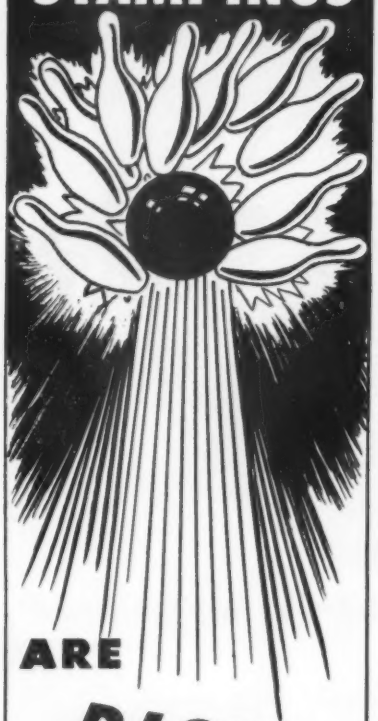

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cupations of man; it is the only means of achieving progress in life. The ability to learn is the most significant native capacity of man. In fact, the ability to learn is the primary characteristic of man's rational nature. The ability to learn is the foundation of every human act and of all human achievement. Psychologists consider that the ability to learn is the best measure of man's intelligence. A good foreman is constantly observing and learning, and as a result, does not lose this ability to learn and assimilate, and apply.

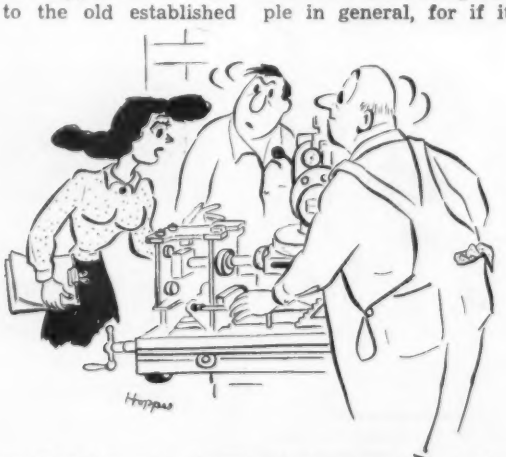
My personal observation within our organization is that the older foremen have learning ability equal to that of the younger men. This relationship changes as we drop down to the employees with lesser skills. Our organization has adopted a very progressive policy on this matter and is meeting with great success. This policy is best expressed by a little motto that the company uses. "An employee's training begins the day he is hired and is not completed until he leaves the company." This phase of the company policy is regarded as being of primary importance to the future success of the organization. After all, anybody can rent a building, any one can buy machines, any one can hire engineers, and designers and salesmen, together with foremen and shop help; but it takes lots more than this to make a successfully operating company. It takes organization, cooperation, and leadership. If these last three were not of great importance, then a company could just as well start out big. There would not be any reason to start small and grow. If these factors of cooperation and leadership were not of great importance, investment money would be available to the new company as readily, or even more readily, as to the old established company. We know that this is not the case; investment funds are difficult to obtain until the company has proven that it has the ability to grow.

It is essential to the company's well-being that the people who are to become the future leaders be found, and helped to develop their leadership qualities to the utmost. The training and development of the leaders of tomorrow is a vital duty of the leaders of today. It is an area in which a lot of progress is being made these days. Our company took a realistic view of this matter and made a survey of the organization to determine how many foremen and supervisors would be needed during the next five years. This survey accounted for needs arising from company expansion and replacement of retiring help. To make sure the need could be filled, we utilized the best of current thinking on employee training and established a carefully planned program to develop the full potential of men moving on to higher posts. It has paid off.

Clifford Molloy
New York, NY

THE ANCIENT AND HOARY idea is that as soon as a man has made 45 complete trips around the sun he must be considered too old to be of further value to his company, and the quicker he is put on the shelf the better off the company will be. Fortunately this notion is rapidly passing. Ed's company seems to be one of the few that is refusing to let Ed go to the State University to improve his knowledge and also his value to them. This medieval thinking is right in line with the intelligence of those people who believed in burning witches, and Trial by Ordeal.

It is fortunate indeed that this idea has never been accepted by the people in general, for if it had, then



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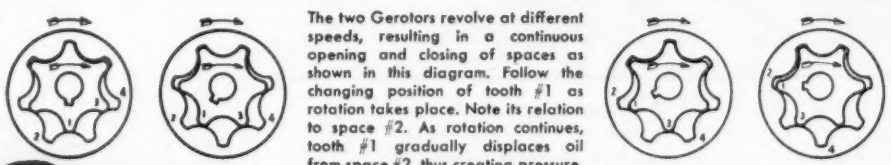

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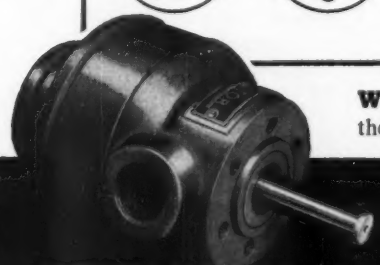

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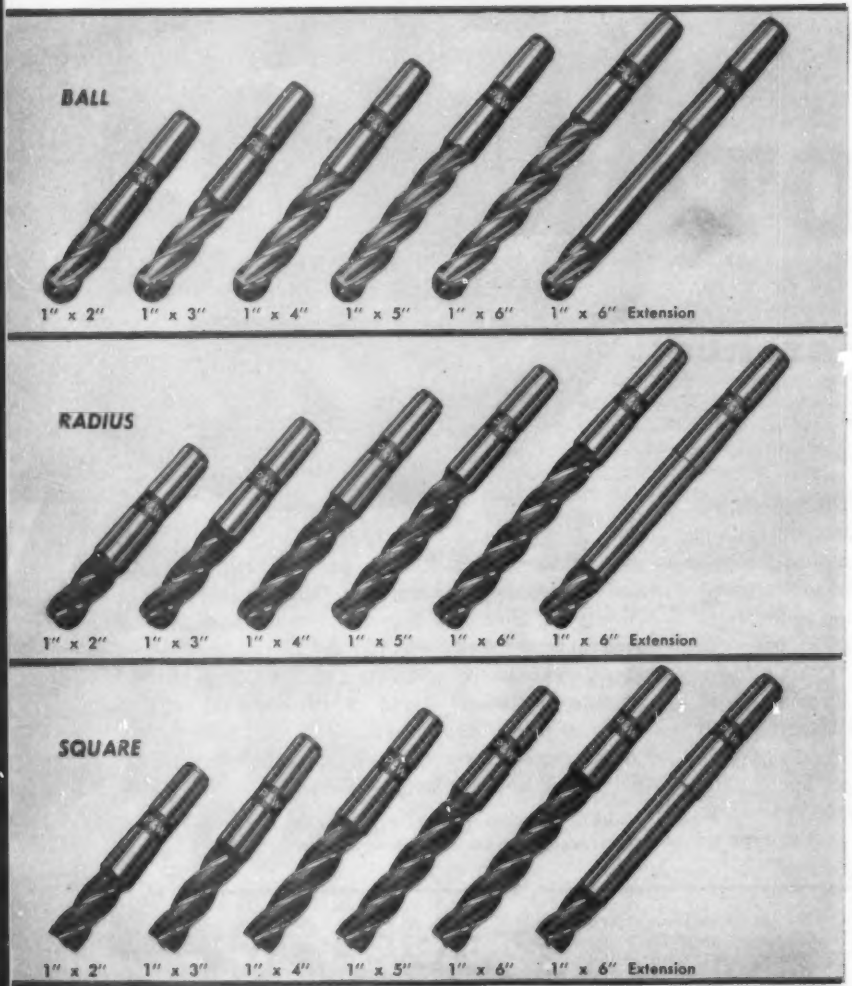

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Mr John Ericsson would never have been permitted to launch the famous first armored turret ship, the Monitor, in 1862, for at that time he was 59 years old and he would have been shelved for 14 years before the event and the history of the USA might have been very different. The first incandescent electric lights would never have been switched on in Manchester, England, in 1880, by their inventor Mr J W Swan, for at that time he was 52 years old and thus would have been shelved for over seven years. Henry Ford did not concentrate on building his model T until he was 46, a year after he would have been shelved on the 45-year theory, and please remember he made a billion dollars after he passed that theoretical useful age limit. Robert A Millikan received the Nobel prize in 1923 for his experiments on the electron when he was 55 years old, or ten years after he would have been shelved if, according to Al, the man Johnson had had his way.

So far as science has been able to determine, the healthy human brain continues to be capable of learning more and more as long as it lasts. There is no time when a healthy person becomes "too old to learn," and in addition to the capacity for learning more, the brain over 45 has a world of knowledge and experience to back up any new learning. This is something which the young college graduate does not have, and it will require 20 years more time and study to acquire.

Perhaps the best and most convincing answer to this 45-year-old, worn-out brain notion is to just consider to whom it is that nations, when in extreme distress and threatened with invasion, turn for help. Is it to the military men under 45, or to those over 45? Just tabulate

"Sure I'll be glad to show you what this kibitzer button is for . . ."

a list of famous generals who won major wars and find what their age was at that time. This may jolt the Johnsons that Al talks about.

This comment must not be taken to imply that young men under 45 are not equally capable and competent to take strong responsibility and prove to all that they can handle the job. These young men, of course, have the advantage that after becoming associated with a company they can continue to learn all about that company's methods and product and thus become more valuable; it is plain stupidity to let go of them when they know so much at the age of 45—or more.

George P Pearce
Albuquerque, NM

ON THE DISCUSSION of men after 45 years of age being considered too old for schooling, can we say these men should not be included when modern ideas are discussed, when they are always looking toward higher goals? Who should know better than those who have struggled with obsolete machinery which, in its day, was considered to be modern.

If one stops to think, it only rests with the individual. Some men are satisfied to go along on the same plane from day to day, while others always look forward to advancement and keep up with new modern ideas and improved machinery. Let us realize that these men, even at a higher age, say 65 or more, are still interested in a business they have worked at for years, and are always ready to listen where improvements can be made. Men who have been moved up to a higher position in old established plants have helped to convert them to modern plants.

In studying human nature, which is an important factor in management, we find the smart men are those who ask questions in order to get information. They let the other fellows feel they are superior on a certain subject, thereby receiving ideas they can use just by listening. Naturally, this does not work out in all cases, but the wise man listens to different ideas, then uses his own judgment.

Some men are forced to retire at 65, not only in mechanical work, but also white collar workers, this being a rule of some large companies, regardless of how valuable a man may be, in order to make room for younger men. If they would only stop and realize that nature often takes care of such things; many die from natural causes before retirement age; accidents, also disasters

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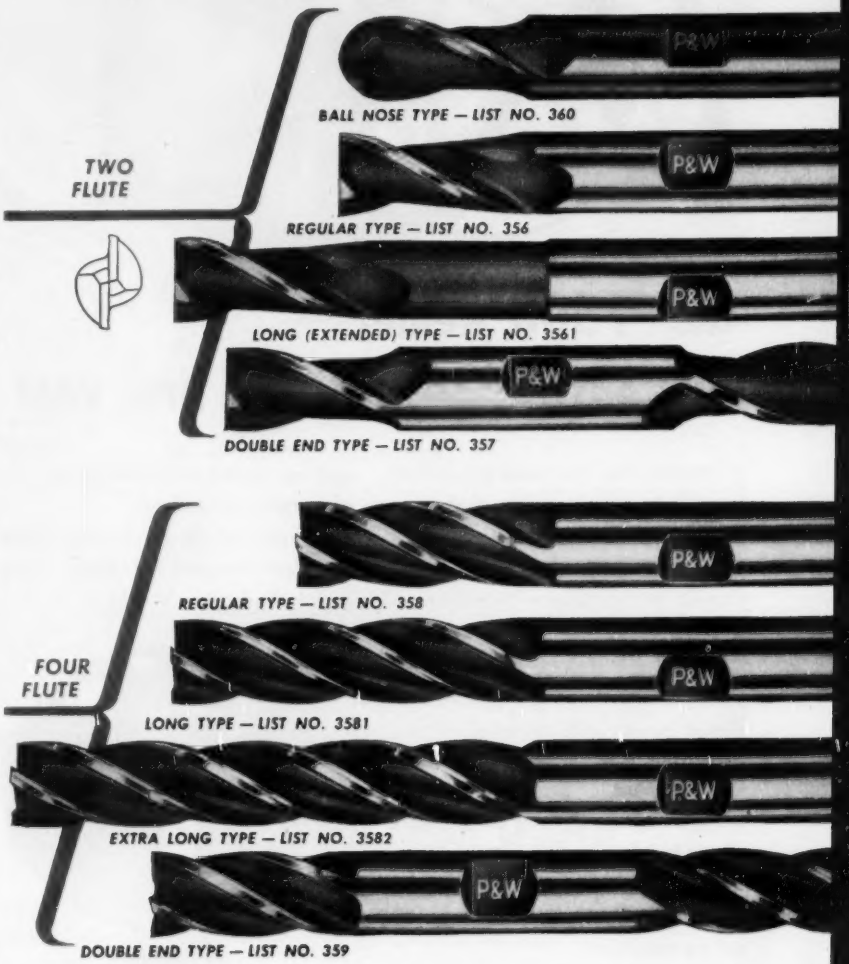
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Preferred for milling operations requiring radii on the end teeth.

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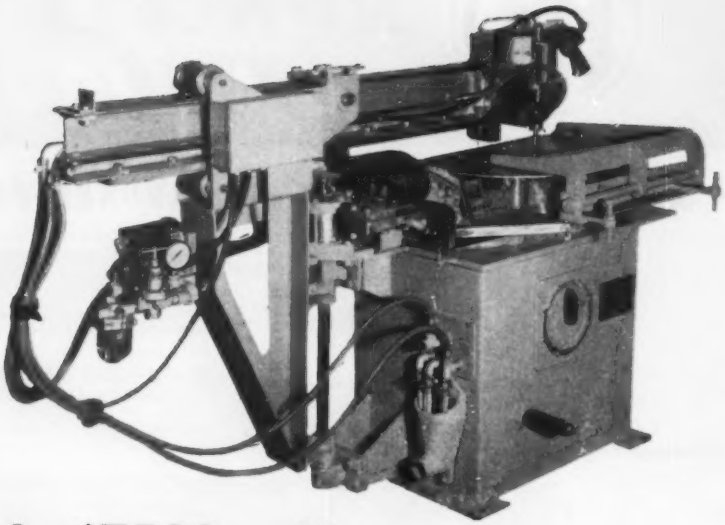


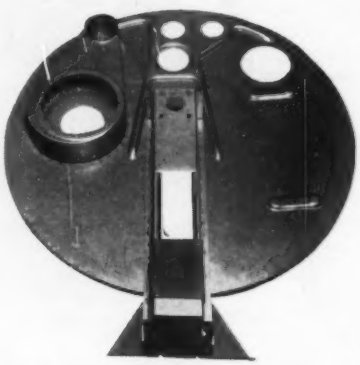
the $7500 welder that saved $25,000 the first year

A machine that increased production enough to effect savings that were double or triple the machine cost during the first year is news to many fabricators not familiar with the versatility of the modern resistance welder. With one man this machine will take the place of four conventional guns and two rocker arm welders requiring a total of six operators. It also eliminates the loss of production due to the unnecessary shifting of the work pieces between operations.

Here is factual proof that special equipment effecting cost saving need not be expensive.

Recent Federal designed and built machines have combined assembly with welding, forming with welding and high speed multiple-shop welding of complete assemblies.

This is part of the reason why—from the start—Federal has always been First In Resistance Welding.



This inner bulkhead assembly for an automatic dryer requires about 50 spot welds. Federal designed a new type expansion gun welder (above) where the gun is supported on the end of a horizontal beam mounted on rollers—moves in all directions—automatically welds as operator squeezes pistol trigger. Manufacturer figures this has saved $25,000 over old method during first year.

Federal WELDERS ®

Warco PRESSES ®

THE FEDERAL MACHINE & WELDER COMPANY
WARREN, OHIO

take part in eliminating many men.

So why say remove responsible men with a greater knowledge and experience when they can still do their job?

C W McLarty
Woodhaven, NY

WHEN DOES A MAN STOP learning? Perhaps at the precise moment when he loses interest in what goes on about him—or when his curiosity goes flat—or perhaps when he gets to thinking that he knows it all. Ability to learn has nothing to do with the number of years that a man has lived.

When a man loses interest in the things going on about him—he is often frustrated and headed for an "in the rut" existence—and what such a man is good for is hard to say.

When a man's curiosity goes flat, he may notice the things that go on about him, but doesn't care how or why. Perhaps he is just mentally lazy, or perhaps his brain has absorbed all that it can absorb. If this is true, this man is indeed headed for a dull existence.

The man who thinks he knows it all is often a misguided egotist who has a potential for learning if he is only willing to use it.

Learning is habit-forming—each experience creates a desire for another experience. Thus, if a man starts early in life to form the learning habit, the chances are that he will be very much addicted to learning as he grows older. One cannot learn all there is to know at any one sitting; it takes time, and time makes age, and age brings the mature mind, or at least age *should* bring mature minds.

When a man is given the responsibility of heading a department, and there is presented an opportunity to enhance his ability or to improve his work, he should at least be given the opportunity to receive this advanced information, regardless of his age. Then should his attitude or reaction toward receiving or acquiring advanced information be such as to indicate a lack of interest, a flat curiosity, or a "know-it-all-ness"—his lack of willingness to learn should be a hint to management to prepare to relieve him of his responsibility, so that the department can advance.

Ability to learn goes hand in hand with the desire to learn, plus a willingness to do so—and desire and willingness to learn should be encouraged.

Henry George
Dayton, Ohio

MICRO Precision Switches

MICRO tips
Published by MICRO
FREEPORT, ILLINOIS
FOR PLANT ENGINEERS, ELECTRICIANS and MAINTENANCE MEN
5 SNAP-ACTION SWITCHES INCREASE SAFETY, SPEED, EFFICIENCY OF SCREW MACHINE
THIS SURFACE GRINDER WON'T OPERATE UNLESS THE MAGNETIC CHUCK IS TURNED ON
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WINNING IDEAS FROM ALEX ELLENB
A SAFETY APPLICATION
THE WINNERS

HOW MUCH is a new production idea worth?

• Every month *MICRO TIPS*, a lively interesting idea forum, offers plant engineers, electricians and maintenance men new, practical ideas to production short cuts.

For years, plant operating men have been putting new life in old machines by installing MICRO precision switches to make them safer, more automatic and more productive.

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MICRO TIPS is the place to read first hand experiences of other plant operating men. Just one new idea on how to make your equipment produce more can be invaluable. The cost? *MICRO TIPS* costs you nothing. Just send in your name and address and ask for *MICRO TIPS* today. You'll be glad you did.

MICRO switches are easy to buy. Look under "Switches, Electric" in your phone book. One of our 176 authorized distributors is as close as your phone.

Micro Switch provides a complete line of small, snap-action switches. They are available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics.

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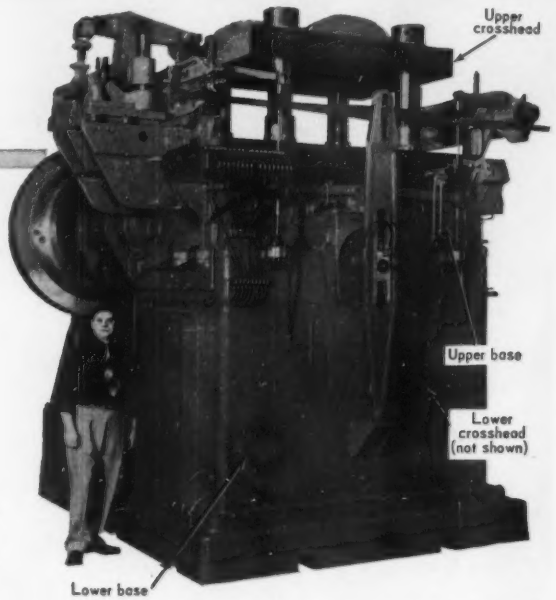
Industry reports what Meehanite Castings have done for them.

PRODUCTION MACHINERY

Maximum Safety Factor —Maximum Strength

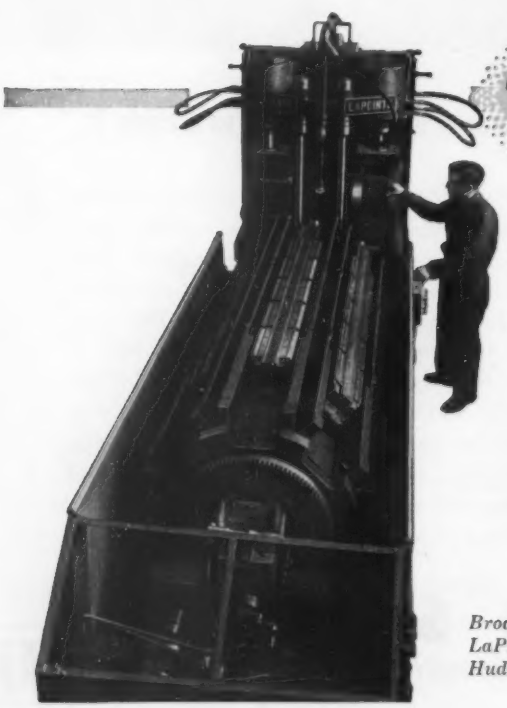
Builder Says:

"We have used Meehanite castings ... to obtain close grained uniform castings of maximum strength ... as additional insurance against breaking."



Meehanite Castings as used in Automatic Dieing Machine
Henry & Wright Division
Emhart Mfg. Co., Hartford, Conn.

MACHINE TOOLS



Dimensional Accuracy Through Less Distortion During Hardening

Builder Says:

"With Meehanite castings ... less machining is involved and there is a minimum of distortion during the hardening process."

Broaching Machine
LaPointe Machine Tool Co.
Hudson, Mass.

HEAVY DUTY ROLLS

Increased Bending Capacity at Low Initial Cost

Builder Says:

"In addition to increasing plate bending capacity from 1 inch to 2½ inches the company saved thousands of dollars by designing and casting the rolls of Meehanite metal."

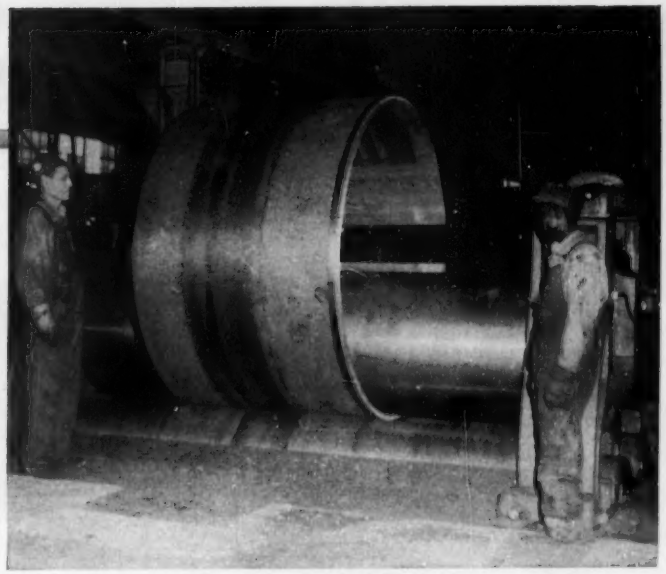


Plate Bending Machine using Meehanite Rolls bends 2¼ inch steel plate. General Iron Works Co., Denver, Colo.

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The American Laundry Machinery Co. . . . Rochester, New York
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Banner Iron Works . . . . . St. Louis, Missouri
Barnett Foundry & Machine Co. . . . Irvington & Dover, New Jersey
E. W. Bliss Co. . . . . Hastings, Mich. and Toledo, O.
Builders Iron Foundry . . . . . Providence, Rhode Island
Compton Foundry . . . . . Compton, Calif.
Continental Gin Co. . . . . Birmingham, Alabama
Crawford & Doherty Foundry Co. . . . . Portland, Oregon
The Cooper-Bessemer Corp. . . Mt. Vernon, Ohio & Grove City, Pa.
DeLaval Steam Turbine Co. . . . . Trenton, New Jersey
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Empire Pattern & Foundry Co. . . . . Tulsa, Oklahoma
Farrel-Birmingham Co., Inc. . . . . Ansonia, Connecticut
Florence Pipe Foundry & Machine Co. . . . Florence, New Jersey
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General Foundry & Manufacturing Co. . . . . Flint, Michigan
Georgia Iron Works Co. . . . . Augusta, Ga.
Greenlee Foundry Co. . . . . Chicago, Illinois
The Hamilton Foundry & Machine Co. . . . . Hamilton, Ohio
Hardinge Company, Inc. . . . . New York, New York
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Johnstone Foundries, Inc. . . . . Grove City, Pennsylvania
Koehring Co. . . . . Milwaukee, Wisconsin
Lincoln Foundry Corp. . . . . Los Angeles, California
Palmyra Foundry Co., Inc. . . . . Palmyra, New Jersey
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Pohlman Foundry Co., Inc. . . . . Buffalo, New York
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Rosedale Foundry & Machine Co. . . . . Pittsburgh, Pennsylvania
Ross-Meehan Foundries . . . . . Chattanooga, Tennessee
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Standard Foundry Co. . . . . Worcester, Massachusetts
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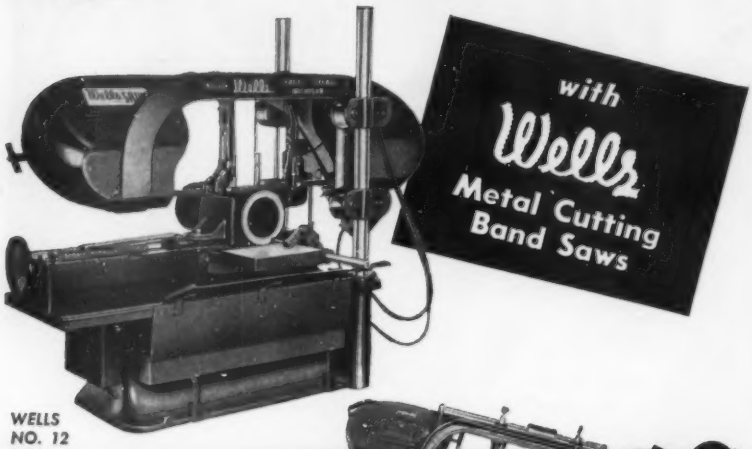

WELLS NO. 12

featuring an Expanded Range of Cutting Speeds

WELLS NO. 8 WITH WET CUTTING SYSTEM, NO. 5 IS SIMILAR

TO IMPROVE cutting efficiency and production, three models of the Wells Metal Cutting Band Saw line are now available with expanded range of cutting speeds as standard equipment. The table below shows the new speed ranges for these outstanding machines . . . Wells Nos. 5, 8 and 12 . . . first in the horizontal field. Higher speeds are available when required.

The new cutting speeds coupled with such proved Wells advantages as sturdy construction, ease of operation, real dependability and low cost make these machines even more profitable for you to use. Ask your Wells Dealer for full information or write, requesting catalog G-52 giving specifications and design details for all models.

Model	Capacity		Selective Cutting Speeds
	Rounds	Rectangular	
No. 5	5" O.D.	5" x 10"	50, 90, 160, 250 f.p.m.
No. 8	8" O.D.	8" x 16"	50, 100, 175, 275 f.p.m.
No. 12	12¾" O.D.	12" x 16"	60, 115, 200, 300 f.p.m.

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METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT ROAD, THREE RIVERS, MICHIGAN

CURRENT BUSINESS

Benchmaster Manufacturing Co, Gardena, Calif, said to be the world's largest producer of small punch presses and milling machines, has purchased the **Clear Beam Television Antenna Co,** Burbank, Calif, and **Tempo TV Products Co,** Los Angeles. Purchase price exceeded $1,000,000. Plans to move both newly acquired companies to consolidated and expanded quarters are underway in anticipation of $3,500,000 sales during 1954.

Operations of **Parkersburg Rig & Reel Co,** Parkersburg, W Va, and **Aetna Ball & Roller Bearing Co,** Chicago, have been consolidated under the name of **Parkersburg-Aetna Corp. A Sidney Knowles,** chairman and president of Parkersburg, has been named chairman of the new organization. **William A Wood,** Aetna president and treasurer, will hold the same offices in the new company. The combined companies, which will operate as divisions, have total assets of $14,000,000.

During 1953, awards for suggestions at **General Motors** totalled $2,419,709, an increase of 44% over the previous high total in 1952. Some 80,309 employees submitted 181,592 suggestions, of which 46,503 were adopted and put into effect. Sixty maximum awards of $2500 each were paid.

Taylor Dynamometer & Machine Co, manufacturer of Hi-Eff equipment, has transferred its general office and research-development department to a new building recently completed by the firm at 6411 River Parkway, Milwaukee, Wis. Some manufacturing and assembly work will also be carried on at the new location. The Hi-Eff tradename covers a line of static balancing machines, dynamometers, and high-speed sensitive small-hole drilling machines.

Two of four wholly-owned subsidiaries of **National Cylinder Gas Co,** Chicago, now operate as divisions, and the corporate charters of the remaining two have been surrendered and their operations taken over by the parent company. **Tube Turns, Inc,** manufacturers of welding fittings and forgings, with headquarters in Louisville, Ky, has become the **Tube Turns Div. Pennsylvania Forge Corp** of Philadelphia, producer of flanges, rings, and heavy forgings, has become a division known as **Pennsylvania Forge Co.** The **Hollup Corp** of

Chicago, and **National Cylinder Gas Co—Pacific Coast,** have been dissolved. These changes, designed to streamline the corporate setup, follow the merger of National with **The Girdler Corp,** which took place last June. Prior to the merger, National and Girdler shared equally in the ownership of Tube Turns, Inc, which owned all the capital stock of Pennsylvania Forge Corp. At the time of the merger, Girdler became a division of National known as **The Girdler Co; it, Tube Turns,** and **Pennsylvania Forge Co,** will now function as operating divisions of National.

Mathews Conveyer Co, Ellwood City, Pa, has begun extensive expansion operations involving construction of a new office and engineering building, and an addition of approximately 25,000 sq ft to the present manufacturing area. The program, scheduled to be completed within a year, is the largest undertaken by the 50-year-old organization; new facilities supplement the company's Pacific coast plant, built in 1946, and the Canadian works at Port Hope, Ontario.

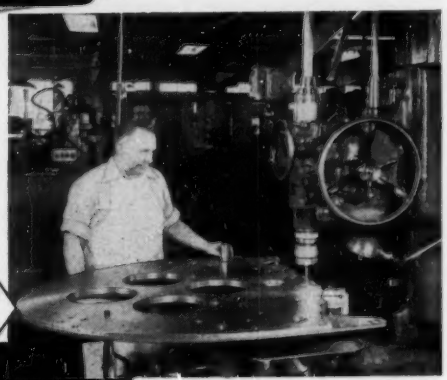
Colonial Broach Co, Detroit, in cooperation with **Demco Tool Co,** Los Angeles, has established a west coast manufacturing affiliate, **Colonial Western Broach Co,** Los Angeles. The new company will manufacture broaches, broaching fixtures, and gages; construction of the plant has been completed and manufacturing equipment installed. Operations will be under the direction of **Peter Starman,** manager, who is also president of Demco. The new company will serve the states of Washington, Oregon, California, Idaho, Arizona, and Nevada. Sales will be handled exclusively by Demco in Los Angeles; additional offices are planned for San Francisco and Seattle.

Whirlpool Corp, St Joseph, Mich, has purchased from **Avco Manufacturing Co,** New York, a 265,000-sq-ft laundry appliance manufacturing plant in Clyde, Ohio, formerly operated by Avco's Bendix Home Appliance Div. Bendix operations will be transferred to Nashville, Tenn, where Avco has a 1,100,000-sq-ft factory.

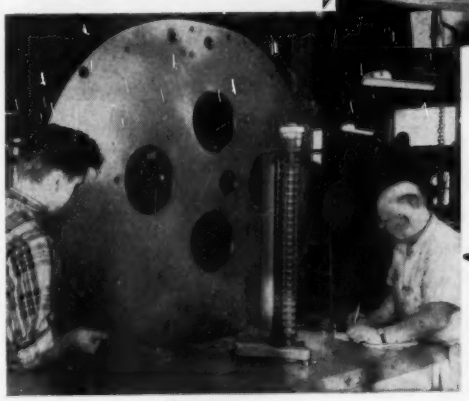
Severance Tool Industries, Inc, Saginaw Mich, manufacturers of Faster Finishing midget mills, and Chatterless seating tools, who recently opened an eastern plant in Westbury, LI, NY, is now adding 2000 sq ft of manufacturing floor space to its main plant at 726 Iowa St, Saginaw.

Contract Jig Boring

What B. Jahn Can Do For You!



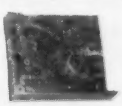
Single jig boring projects such as this jet aircraft fixture.



Jig boring a master fixture section for jet aircraft. Bushings were fitted to multiple holes with tolerances accurate to .0005".

Final inspection of one of four fixture sections for jet aircraft. This master fixture measures 18 feet when fully assembled.

Production jig boring projects such as thousands of these precision components.



Or this seemingly impossible assignment: To bore over 148 different size holes at different angles, holding rigid relative tolerances into precision alloy castings, completed value of which, was over $5000 each.

Engineers are relying on B. Jahn every day to lick their *real tough* problems. Investigate the facilities at B. Jahn. 16 of the latest jig borers, every size, manned by master toolmakers and piloted by the best engineering brains available.

Investigate B. Jahn and Invest in Production Economy!

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FULL *8-Hour* SHIFTS WITHOUT A GRIND

These standard W & B high speed drills keep going for a full eight hours on each grinding—no shut-downs during shifts for resharpening or replacement of dull drills for this manufacturer of oil and gas well head equipment.

Casing heads are alloy steel having a Brinell hardness of 185-260. Drilling of bolt holes in casing head flange is done on a 16 spindle "Hole Hog." Operated at 126 R.P.M. and with a .015″ feed per revolution, the high speed W & B drills quickly and efficiently complete the drilling of twenty 1½″ diameter holes 3″ deep in each flange.

This example of unusual drill durability and efficiency is indicative of the high performance you, too, can have by specifying W & B for your drilling operations.

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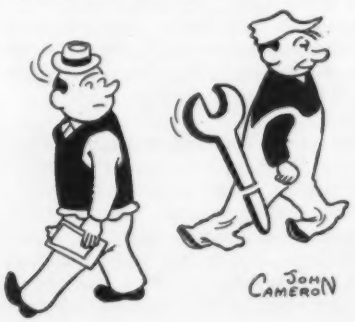
Eaton Manufacturing Co, Cleveland, has acquired the common stock of the **Spring Perch Co** of Lackawanna, NY, manufacturers of chassis springs, principally for trucks. Existing facilities will be improved and expanded to provide for future potential requirements that cannot be handled by Eaton's Spring Div in Detroit. **F I Goodrich,** general manager of the Detroit division, will head the newly acquired subsidiary; **E H Lindeman,** manager of the Leaf Spring Dept, will be vice president, and **J E Jawcett,** resident manager.

Clark Equipment Co, Buchanan, Mich, manufacturers of industrial materials handling trucks, construction equipment, and heavy automotive components, is erecting a new plant on the outskirts of Benton Harbor, Mich. Construction is scheduled to start immediately on a 100-acre tract of land, and the plant is expected to be in operation before the end of the year. The 145,000-sq-ft building will be used as an assembly plant for a new line of tractor shovels to be produced.

The **A K Tool Co** has relocated its facilities in a new plant in Mountainside, NJ, on US Route 22.

Magnolia Metal Co, Elizabeth, NJ, has acquired the physical assets and business of the **Marion Brass & Bronze Foundry** of Marion, Ohio; the move extends the Magnolia bearing metal line to include completely finished special dimension bronze bushings. Facilities will be operated by Magnolia's newly formed, wholly owned subsidiary, the **Marion Brass & Bronze Foundry, Inc.** Sales, purchasing, and general accounting will be conducted from the parent company's main office in Elizabeth.

Kennametal Inc, of Latrobe, Pa, is constructing a new manufacturing plant and office building in the Detroit area: 10201 Capital Ave, Oak Park, Mich. An April 1 opening is scheduled for the new works, planned for production of tungsten carbide tools and specialties.



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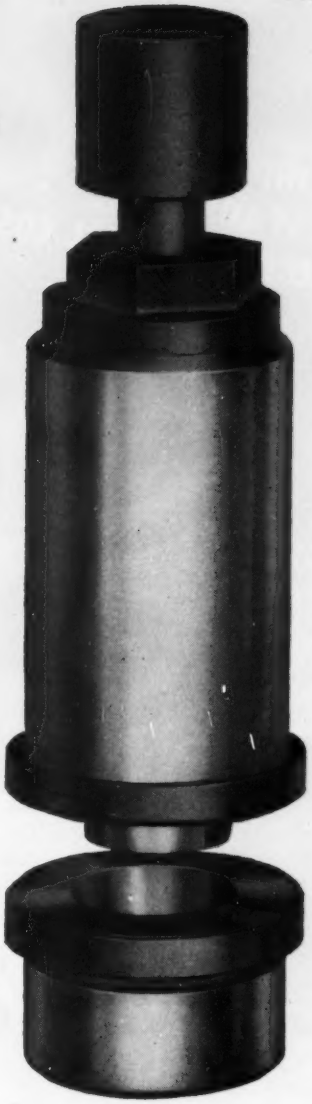
UNIVERSAL INDEX PLUNGERS

SAVE TIME
SAVE MONEY

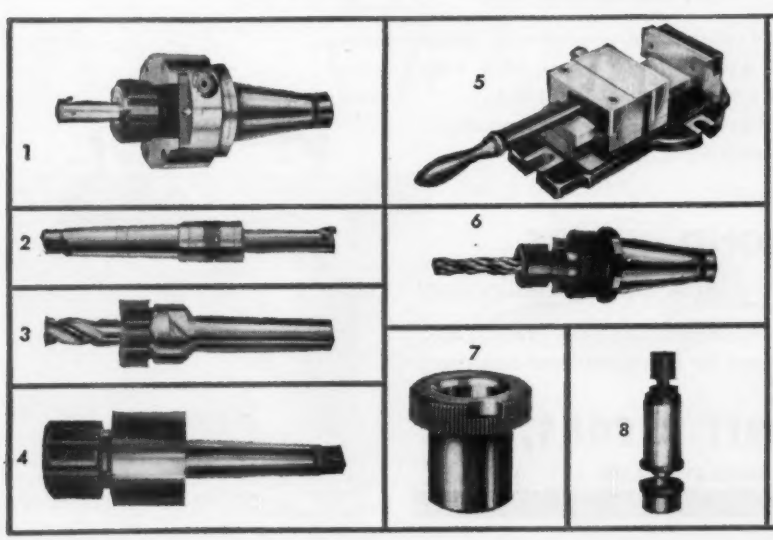
Universal's Straight and Taper Plungers made in standard sizes save the time and expense of designing and machining special index plungers for multi-station tools. They come to you complete, ready for installation at approximately ¼ the cost of specially made plungers.



Soft pin knob permits connection to actuating lever or air cylinders by several different methods. Locating bushing, plunger and plunger bushing are hardened and ground.

Plunger is easily assembled from either top or bottom. And it can be removed in either direction by removal of hex nut.

Universal Plungers greatly simplify jig or fixture manufacture because plunger body and bushing have same diameter so that all holes can be bored with same tool, often in same setting.



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 1 MICHIGAN

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(2) MIKRO-LOK BORING BAR
(3) STANDARD COLLET CHUCK
(4) FLOATING COLLET CHUCK
(5) WEDGE-LOCK PRODUCTION VISE
(6) "KWIK-SWITCH" TOOL HOLDER
(7) STANDARD DRILL BUSHING
(8) UNIVERSAL INDEX PLUNGER

168

In a four month period under actual competitive conditions one Diamond Wheel ground 36,976 pieces, while eight silicon carbide wheels ground a total 16,023 pieces.

RESULT— 1. Less cost per piece 2. Greater Production 3. Less down time.

See for yourself how

SECOMET DIAMOND WHEELS

can provide you with these plus values

Send for informative catalog #54 or contact us direct for information and assistance.

J. K. SMIT & SONS, INC.

MURRAY HILL, N. J.

Rapids-Standard Co, Grand Rapids, Mich, has purchased an interest in **The Keystone Conveyor Co,** Detroit manufacturers of endless chain conveyor for broad application in industry. New name of the Detroit firm is **Rapistan-Keystone, Inc. William Beveridge** continues as president and general manager; **Geoffrey Coombes** is sales manager.

Burg Tool Mfg Co, Los Angeles, has opened the **Midwestern Burgmaster Machinery Co** in Chicago, under the management of **R A Gorman.** The office will handle sales and services of Burgmaster products in the midwestern states, including Illinois, Indiana, Missouri, Iowa, Kansas, Nebraska, Minnesota, and Oklahoma. Location is 5329 Lincoln Ave; warehousing facilities for machines, parts, and accessories will permit direct shipment from this point. The company has a mobile Burgmaster unit for plant demonstrations throughout the seven-state area upon request.

American Metal Products Co, Detroit, and **Tube Reducing Corp** of Wallington, NJ, have merged their companies; preliminary arrangements for the move on a stock-for-stock basis were announced on Dec 1. American Metal manufactures electric welded tubing for use in fabricating automobile seat-frame assemblies, axle housings, and similar products. Tube Reducing produces close-tolerance, compression-sized seamless tubing for a wide variety of end uses.

Baldwin Belting, distributors in New York and New Jersey for B F Goodrich industrial rubber products, and manufacturers of leather belting and related items, has opened a branch and warehouse at 43 Oak St, Clifton, NJ.

"I have a little extra work for you tonight Jenkins . . . anything special you would like for breakfast?"

Why V-Belts with CONCAVE SIDES Last Longer!

(U.S. PAT. NO. 1813698)

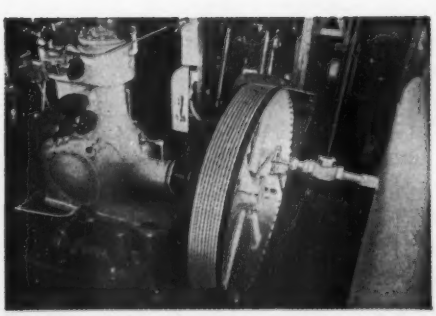
Prove this yourself!

Take any *straight-sided* V-Belt (Fig. 1). Bend it—as it bends in going around a pulley. The sides will at once *bulge out* (Fig. 1-A). Clearly, those bulging sides will press *unevenly* against the V-pulley—and this causes *extra wear* at the points shown by the arrows (Fig. 1-A).

Now bend a Gates Vulco Rope with CONCAVE SIDES (Fig. 2)

Instead of *bulging,* the precisely engineered CONCAVE SIDES merely *fill out* to *fit exactly* in the sheave groove (Fig. 2-A). The sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the *full width* of the Gates Vulco Rope—and this means *longer* belt life and *lower belt costs* for you!

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE Sides—the Gates Vulco Rope!



Typical Gates Vulco Rope Drive—the Gates V-Belts are built with Concave Sides to insure longer belt wear.

Gates VULCO ROPE DRIVES

REG. U. S. PAT. OFF.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

THE GATES RUBBER COMPANY
DENVER, U.S.A.

CB-588

STANDARDIZE!

ECONOMIZE!

with the bushing that's interchangeable

TAPER-LOCK

A PATENTED PRODUCT OF DODGE

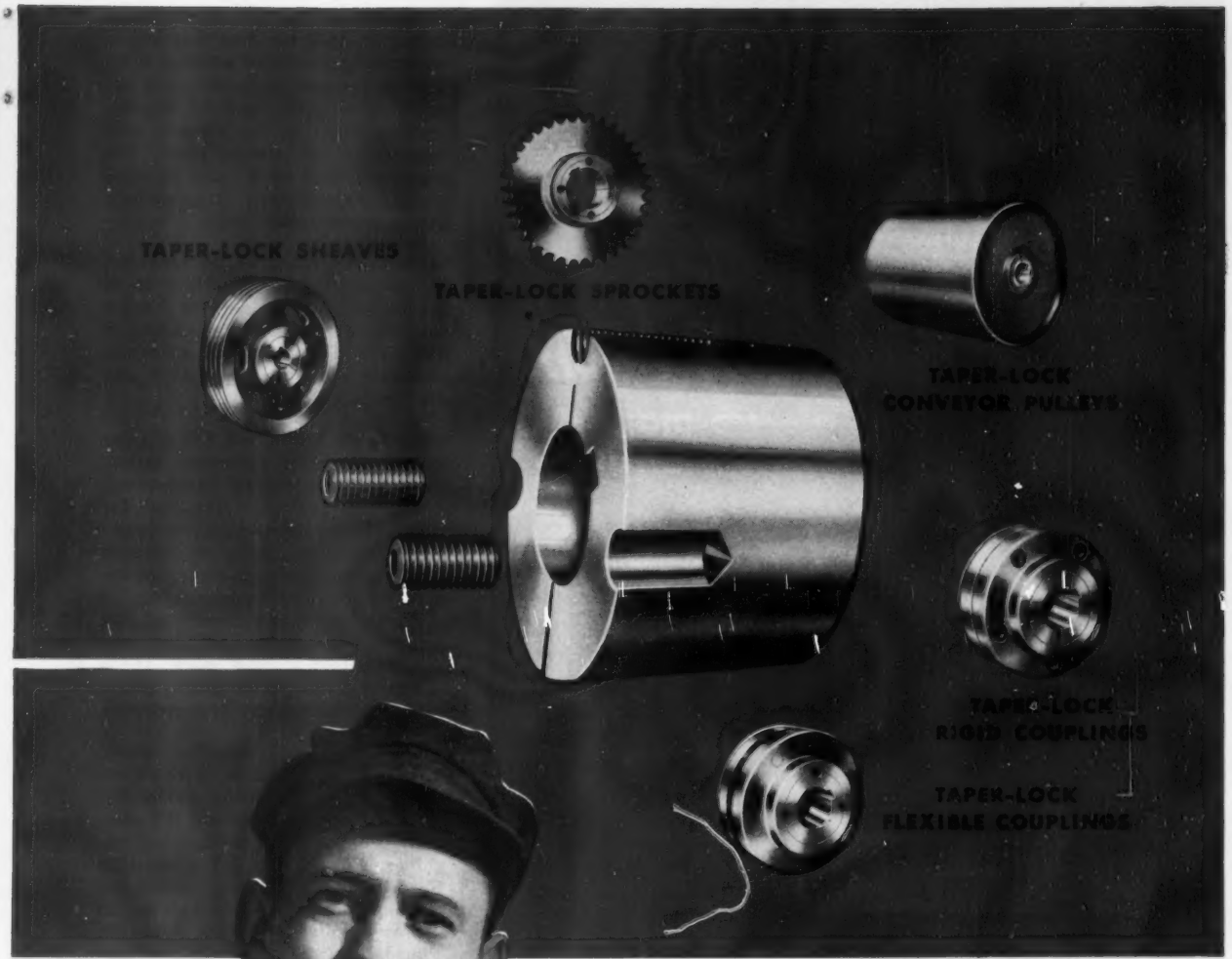
Now mount 'em all—your sheaves, sprockets, couplings, conveyor pulleys —with Taper-Lock bushings. You'll save time, save money, and keep production rolling by standardizing on these interchangeable bushings.

Taper-Lock, a patented product of Dodge, provides the simplest, surest means of mounting wheels on shafts. Dodge Taper-Lock products slip onto the shaft easily, quickly—hold with the firmness of a shrunk-on fit. They come off easily—no hammer, no crowbar, no shock to bearings or machinery.

Taper-Lock bushings fit in every one of the Dodge products pictured above. You can shift from a sprocket to a sheave, for instance, and use the same bushing. And Taper-Lock bushings are available in a range of sizes which makes changing from one size shaft to another equally easy and quick.

With a few Taper-Lock bushings you can make quicker changes and cut down-time on production machines. Get the facts now.

DODGE MANUFACTURING CORPORATION, 100 UNION STREET, MISHAWAKA, INDIANA



THERE'S ONLY ONE TAPER-LOCK,
THE BUSHING THAT MOUNTS FLUSH!

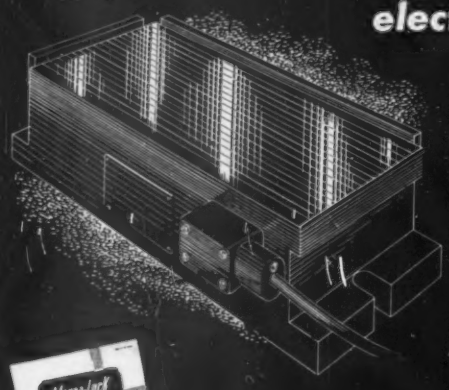
DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor, for valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book, or write us.

SMALL CHUCKS
FOR THOSE SMALL JOBS...

it's **Magna-Lock**
electro-magnetic CHUCKS



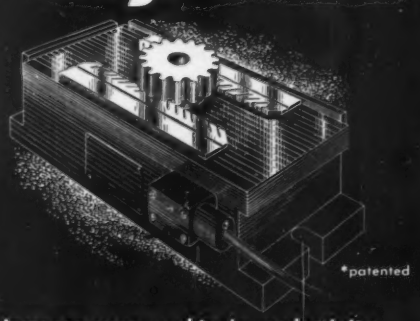
5" x 10"... 6" x 12"... 6" x 18" working surfaces. Ideal for bench work, small machine tools. 22% more holding power . . . moisture proof . . . other advantages of larger Magna-Lock Chucks. Complete with rectifier and switch for operation on A.C. voltage.

Price: 5 x 10 ..... $125.00
6 x 12 ..... 159.00
6 x 18 ..... 225.00
IMMEDIATE DELIVERY.

Get details... WRITE DEPT. AM-34

...AND FOR NON-MAGNETIC MATERIALS it's **Magna-Vise*** ★

HOLDS fibre, brass, copper, plastic, others. Increases versatility of your magnetic chucks. Send for facts.



*patented

Magna-Lock is first to increase your machine's productivity

Hanchett **MAGNA-LOCK CORPORATION**
Magnetic Chucks and Devices
BIG RAPIDS, MICHIGAN, U. S. A.

Standard Steel Spring Div, Rockwell Spring & Axle Co, Los Angeles, is constructing a $600,000 addition to its plant to increase manufacturing capacity 100% on its April 1st completion. Addition on the 3.6-acre site, adjacent to the present plant, will comprise 81,000 sq ft, and, is additionally expected to increase employee requirements 100%.

Investment Casting Co, Newark, NJ, has moved to new quarters at 60 Brown Ave, Springfield, NJ. Larger facilities are available for casting in ferrous and non-ferrous materials, including both the "lost wax" and shell-molding processes.

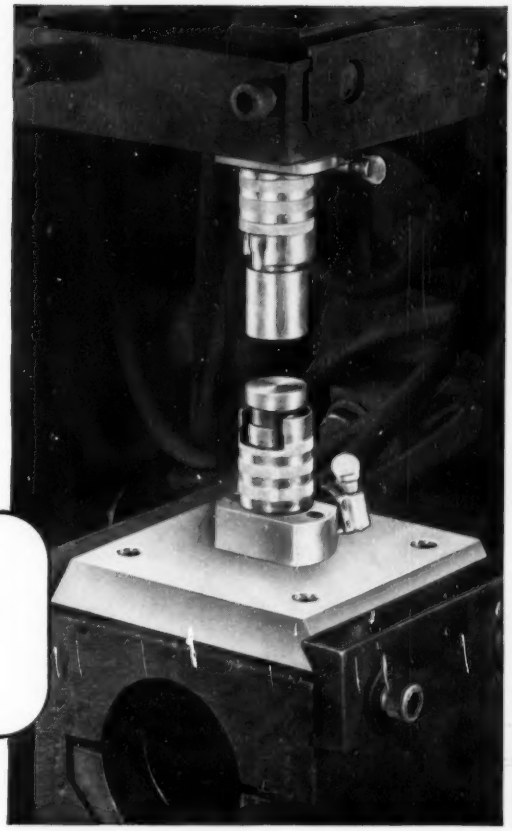
Louis Levin & Son, Inc, Los Angeles manufacturers of jewelers lathes, micro-drillpresses, and many precision tools originally designed for watchmakers, has moved into larger quarters to meet increasing demands for precision micro-machining equipment. A new, 7500-sq-ft building, located at 3610 South Broadway, Los Angeles, will provide additional shop and inventory storage space, and a complete display room where setups on Levin tools can be demonstrated.

Size Control Co, Chicago, has opened a new office at Boston, Mass, in cooperation with **Sterling Sales, Inc.** New sales office, handling the company's line of gages and lapping machines is located at 417 Cambridge St, Allston, Mass. Size Control has also appointed **Bert Lewyn** as its representative in Georgia, Alabama, Florida, and the eastern half of Tennessee. Mr Lewyn is located at 770 Virginia Circle, NE, Atlanta.

Permutit Co, New York, makers of all types of industrial and commercial water conditioning equipment and ion exchange resins, is building a metalworking plant at Lancaster, Pa, scheduled for completion during the next few months. Plant, to cost $750,000, occupies two acres on a 30-acre site, expandable when required. Consolidation at Lancaster of the plants in Brooklyn, NY, and Philadelphia will be completed by the end of the year. Main executive and sales office in New York, and the Birmingham, NJ, manufacturing plant will be maintained.

The Producto Corp, Detroit supplier of diesets and diemakers' equipment to the industry throughout the midwest, has moved to larger quarters in the Oak Park section of the city. Newly constructed building at 10200 Capital Ave, has been designed to improve service on special sets and stocks.

SAVE Set-up Time... REDUCE Die Inventory



You can change resistance welding die set-ups in seconds with the MALLORY *"Nu-Twist" die adaptor*

The Mallory "Nu-Twist" die adaptor is designed to give you complete flexibility in welding operations . . . with only one die set-up.

Any shop having short run resistance welding applications such as projection welding, single spot welding and electrical upsetting can effect real savings in time, to say nothing of reduced die inventories.

Die adaptor bases are custom-designed to fit machine specifications. Your Mallory distributor can provide standard electrodes for quick delivery. If you need special shapes or sizes, we can design them to fit any requirements.

All the operator has to do is shut off the water supply, turn the locking nut by hand, slide out the electrode insert, slip in the one for the next job, and turn the locking nut. It takes only a few seconds . . . with no tools required.

Typical projection welding electrode with insulated locating pin.

Electrode insert for spot and mash welding, electrical upsetting or single projection welding.

Electrode insert for typical projection welding operation.

New Catalog Call your distributor . . . or write to us . . . for your new Mallory Welding Catalog. It contains complete data on electrodes, holders, rod and bar stock, castings, forgings and accessories.

Expect More . . . Get More from P.R. MALLORY & CO. Inc. **MALLORY**

In Canada, made and sold by Johnson Matthey and Mallory Ltd., 110 Industry Street, Toronto 15, Ontario.

Serving Industry with These Products:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators
Electrochemical—Capacitors • Rectifiers • Mercury Batteries
Metallurgical—Contacts • Special Metals and Ceramics • Welding Materials

P.R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio.

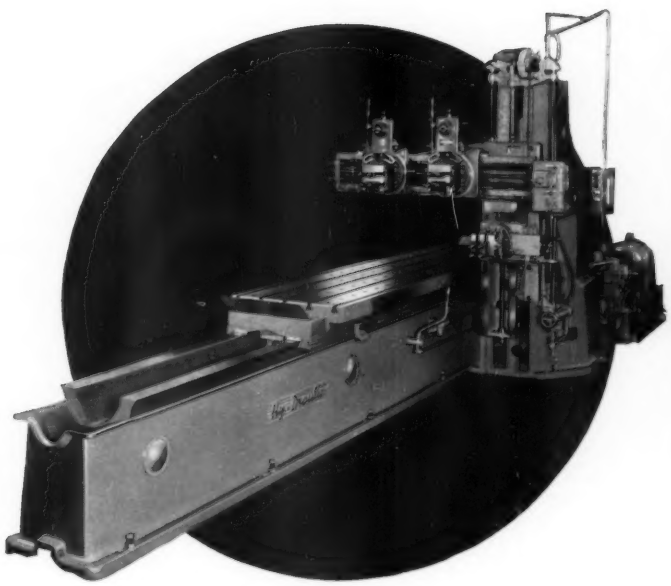
hydraulic drive...a natural for

CHECK-POINT OF MAXIMUM INVESTMENT RETURN

Rockford Machine Tool Co.

reciprocating machine tools

Hydraulic Drive and Feeds, as basic features in modern machine tool design, provide outstanding performance, measured in terms of work quality, high production and low operating cost. We have had over 25 years of experience in applying Hydraulic Drives and Feeds to Shapers, Planers and Slotters.



rockford hydraulic shaper-planers

Simplified Controls
Quick Set-Up
Fast Operation
Stepless Speeds
Smooth Cutting
Fast Reversals
Long Tool Life

Unmatched for the efficient, economical handling of work that is somewhere in size between shaper and planer capacities.

shaping / planing / duplicating / turning

our 52nd year

Rockford, Illinois

To meet a human need . . .

We believe that the hands of America's workers are industry's most important tools. For this reason we are proud to introduce the **Scott Industrial Wiper,*** which is successfully meeting the wide range of wiping needs in industry. It is a general-purpose, disposable wiper designed to handle your jobs safely, efficiently and economically. A Scott man stands ready to demonstrate this product in your plant.

*PAT. PEND

SCOTT PAPER COMPANY, CHESTER, PENNSYLVANIA

REPRESENTATIVES AND DISTRIBUTORS

Big River Equipment Co, 1344 W Third St, Davenport, Iowa — for **Parker Sweeper Co's** (Springfield, Ohio), manual and motorized floor sweepers and Fold-A-Way utility carts throughout middle and eastern portions of Iowa.

Toncray Equipment Co, 1732 Blake St, Denver, Colo, has been named to represent the **Linatex Corp of America.** In addition to handling sales in the territory, Toncray has facilities for fabrication and application.

Raymond J Nagy, Simsbury, Conn, has been named state sales representative for **Adamas Carbide Corp** of Harrison, NJ, manufacturers of standard carbide tools, tool tips, dies and wear parts.

Industrial Vibrator & Machinery Co, 7 Front St, San Francisco 11, Calif, has been appointed West Coast distributor for **The Cleveland Vibrator Co's** line of vibrator equipment used in moving materials.

Research Instrument Co, 12410 Triskett Rd, Cleveland, has been appointed Ohio representative for the **Tinius Olsen Testing Machine Co,** Willow Grove, Pa.

Stout & Loman, 712 Sycamore St, Kokomo, Ind, has been named representative in all of Indiana, except Lake and Wayne counties, for the **S-P Mfg Corp** (Cleveland) line of power chucks, rotating and non-rotating air and hydraulic cylinders. **Virgil P Poleos,** 4819 Santa Barbara, Los Angeles, represents the company in California and Arizona.

Turner Metal Supply Co, 2314 Laura Ave, Huntington Park, Calif, has been appointed a distributor of Reynolds aluminum for **Reynolds Metals Co.**

Garco Machinery, 21000 St Clair Ave, Cleveland, will represent the **Van Norman Co,** Springfield, Mass, makers of milling machines and special production grinders in the northeastern Ohio area.

Parry Engineering Co, 154 Nassau St, New York, has been appointed representative for flexible shaft couplings manufactured by **Poole Foundry & Machine Co,** Baltimore.

Rivett Lathe & Grinder, Boston, has appointed **Ficke Engineering & Supply Co,** 305 Pattie Ave, Wichita,

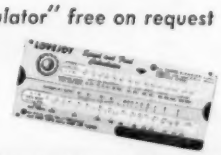
The
Complete
LOVEJOY LINE
of Modern Metal
Cutting Tools

The Lovejoy line of inserted-tooth type cutting tools has never been more complete — or offered so many features. Every tool has been designed to give maximum production with a minimum of down time for sharpening. Lovejoy tools feature the *exclusive* "Positive-Locking" device that assures rigidity even during heavy intermittent cuts — making them rugged as solid tools. Their housings — of husky forged steel — are designed for longest life.

Lovejoy H. S. S., Carbide and Cast Alloy Blades are interchangeable in the same housing and are stocked for immediate shipment.

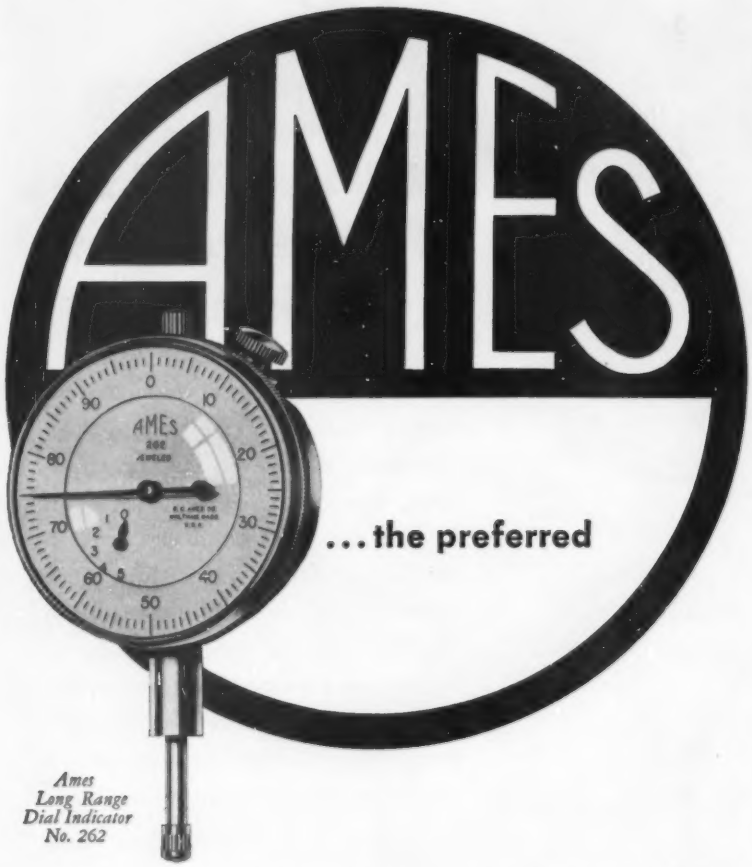
For standard or special cutters, call on Lovejoy — suppliers to the world's leading manufacturers for over 35 years. Write today for Catalog No. 28 which describes the full line of Lovejoy tools.

"Speed & Feed Calculator" free on request



128 MAIN ST., SPRINGFIELD, VERMONT

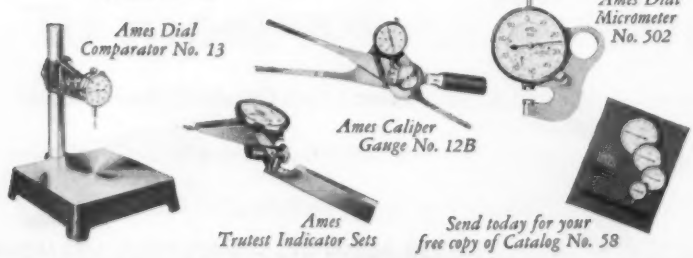
LOVEJOY
TOOL COMPANY, INC.



Ames Long Range Dial Indicator No. 262

... not because they cost more (in the long run they're more economical) but because they're completely *impersonal.* They do their measuring jobs absolutely independent of the human hand.

For more than 50 years, Ames Micrometer Dial Gauges and Indicators have kept pace with increasingly critical precision requirements. Today, each part of every Ames product is carefully built by exclusive Ames methods and machines from the materials best suited to its function — and 100% checked for accuracy. As a result, all Ames products are extremely accurate and sensitive, yet rugged and tough — to give you *longer* service with *less* down-time.



Ames Dial Comparator No. 13

Ames Caliper Gauge No. 12B

Ames Dial Micrometer No. 502

Ames Trutest Indicator Sets

Send today for your free copy of Catalog No. 58

Representatives in principal cities. B. C. AMES CO. *26 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

Kans, as representative in the Kansas area for its line of air and hydraulic valves and cylinders, and power units.

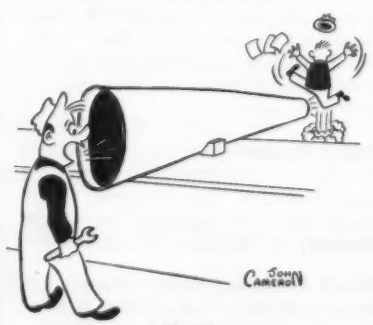
Whitney Chain Co has opened a new warehouse, specifically designed for stocking and handling of power transmission products, located at 554 Deering Rd, Northwest, Atlanta, Ga. The new building houses company district headquarters, in addition to its warehouse activities. **Glenn E Tinsley,** district manager, directs the warehouse.

Howard C Foster has been transferred from **Gisholt Machine's** Madison, Wis, office to its Clifton, NJ, branch office. He handles both sales and service work out of the office, located at 1051 Bloomfield Ave. **Philip E Denu** and **John Leo** continue duties as district manager and resident service manager, respectively.

Albert W Pendergast Safety Equipment Co, 6913 Tulip St, Philadelphia, has been appointed regional distributor for Berylco non-sparking safety tools produced by **The Beryllium Corp,** Reading, Pa. In addition to metropolitan Philadelphia, the company will serve customers in Delaware, southern New Jersey, and Pennsylvania east of Williamsport.

The Grav-i-Flo Corp, Sturgis, Mich, manufacturers of barrel tumbling equipment and supplies, has appointed **Eugene N Jarvis,** Detroit, as factory sales and service representative in the southeastern Michigan area. He will make his headquarters at the offices of **Wagner Brothers,** 400 Midland Ave; the company has added the Grav-i-Flo line to its facilities.

Clearing Machine Corp, manufacturer of hydraulic and mechanical power presses, has appointed **Thomas Hamilton** salesman in the Detroit area. He will work out of the company's office located at 10600 Puritan Ave. Mr Hamilton has been a member of the firm since 1938.



"Boo!"

NEW FILMS

5000 YEARS OF FORGING—*Utica Drop Forge & Tool Co, Utica 4, N Y. 16mm, sound, black and white. Running time 20 min.*

Starting with primitive man's crude processes, the film traces the development of forging through the superb craftsmanship of the Middle Ages to today's scientifically controlled, high-production methods. Many months of the most careful research has gone into the picture, and no effort has been spared to produce an authentic atmosphere. Sources include the Craft Shops of Kenneth Lynch & Son, Wilton, Conn, the J Woodman Higgins Armory, Worcester, Mass, and the Village Blacksmith Shop at Farmer's Museum, Cooperstown, NY.

Apart from its historical interest, the film's most interesting scenes—to technical people—is the demonstration of upsetting by induction heat. To those not familiar with the forging process, the entire picture should be extremely fascinating.

•

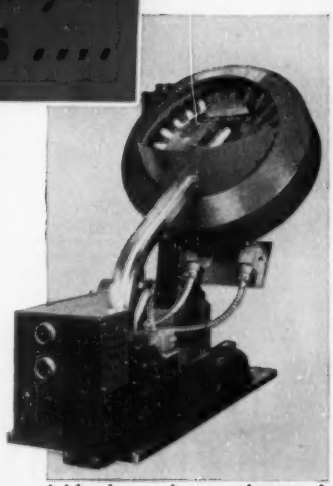
NEW HORIZONS IN ALUMINUM BRAZING—*Aluminum Co of America, 854 Alcoa Bldg, Pittsburgh 19, Penna. Running time 22 min. Sound, color, 16 mm.*

Demonstrating the latest brazing techniques for light metals, this film shows not only what can be done in the field of joining by brazing, but shows just how to go about it. Separate sections of the picture cover torch brazing by gas torch; furnace brazing; and brazing by dipping the

"I'm deeply touched. Thank you staff members and petty cash."

PRODUCTION
Pacemakers in
MODERN INDUSTRY

DPS SCREWDRIVERS *and Motorized* HOPPERS ....



PROVIDE ASSEMBLY SPEED THAT CLEARS THE WAY FOR FASTER, UNINTERRUPTED OUTPUT

• Your production program need not be retarded by outmoded assembly methods . . . Substitute slow, manual handling with speedy, mechanical action . . . Use DPS modern power-driven equipment . . . Benefit by the advantages of lower labor costs, on-time deliveries greater profits . . . Detroit Power Screwdrivers and Motorized Hoppers have brought about a new era in the feeding and assembly field. Find out quickly how these advanced machines can be adapted to your requirements . . . Send samples now for detailed information.

DETROIT POWER SCREWDRIVER CO.

OVER ONE HUNDRED YEARS OF CONTINUOUS SERVICE. ROUNDS, SQUARES, FLATS, HEXAGONS, OCTAGONS

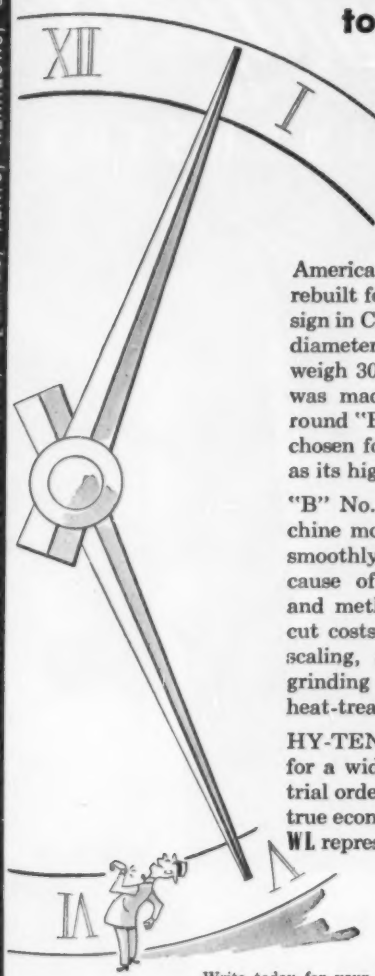
BILLETS AND FORGINGS FOR PRODUCTION, TOOL ROOM AND MAINTENANCE REQUIREMENTS

it's the right time

to Investigate the Qualities of

HY-TEN

ALLOY STEEL



America's largest clock was recently rebuilt for a spectacular illuminated sign in Chicago. It measures 50 ft. in diameter — hands and movement weigh 3000 lbs. The new driveshaft was made from 6 ft. of 3½-inch round "B" No. 3X heat-treated bar, chosen for its machinability as well as its high physical properties.

"B" No. 3X heat-treated bars machine more readily and finish more smoothly than standard alloys because of their particular analysis and method of manufacture. They cut costs by eliminating distortion, scaling, straightening — and often grinding — as well as the cost of heat-treating finished parts.

HY-TEN "B" No. 3X bars are used for a wide range of applications. A trial order will convince you of their true economy. Just call your nearest WL representative.

Write today for your FREE COPIES of Wheelock, Lovejoy Data Sheets, indicating your title and company identification. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.

WHEELOCK, LOVEJOY & COMPANY, INC.

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assemblies into a bath of molten flux.

Interesting new applications are illustrated by a brazed aluminum automobile cylinder block and head, a torque converter part, an outboard motor assembly, and a type of sandwich construction. Cast, forged, and extruded components are illustrated as well as an example of a brazed part made from aluminum sheet and tube.

Methods used by Alcoa's research laboratories to help manufacturers adapt brazing to their product, and the work of the process development laboratories in developing new brazing tools and methods, are outlined.

•

TECHNIQUES OF SURFACE GRINDING — *A color film prepared by The Do-All Co, 254 N Laurel Ave, Des Plaines, Ill. 31 minutes, 16 mm sound. Free loan basis to business firms, engineering societies and associations, schools, and similar organizations.*

This film deals with what a surface grinder should do, using actual performance to demonstrate desired characteristics.

Subjects covered include design elements and their effect on performance, diagrams showing control methods, principles and practice of dressing and balancing grinding wheels, cooling methods and results, operating hints, and modern methods of form-grinding.

Scenes show actual high-production operations currently being done in various plants, using surface-grinding equipment.

An interesting section shows the effect on the shape and size of chips when different grinding techniques are followed.

"And do you know who told me this month's schedule had been changed? Charlie, the sweeper!"

any way you look at it...

SIMONDS ABRASIVE CO.

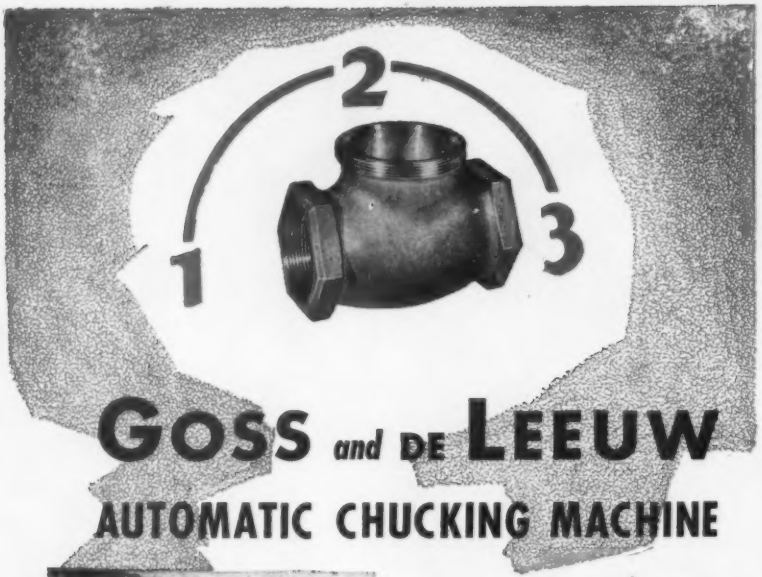
Plate Mounted Wheels *save money* for Carbide Tool Grinding

Less costly than diamond wheels! Especially efficient for roughing, semi-finishing and, frequently, finishing, too! Made to high standards of accuracy. Grind fast and cool. Made to fit all leading makes of grinders. Prompt delivery from stock. Write for bulletin ESA-181.

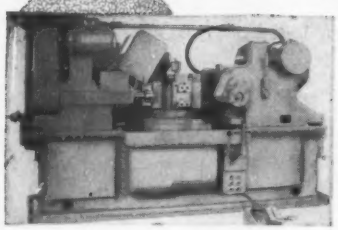
SIMONDS ABRASIVE COMPANY • PHILADELPHIA 37, PA.

BRANCH WAREHOUSES: BOSTON, DETROIT, CHICAGO, PORTLAND, SAN FRANCISCO • DISTRIBUTORS IN PRINCIPAL CITIES

DIVISION OF SIMONDS SAW AND STEEL CO., FITCHBURG, MASS. • OTHER SIMONDS COMPANIES: SIMONDS STEEL MILLS, LOCKPORT, N.Y., SIMONDS CANADA SAW CO., LTD., MONTREAL, QUEBEC AND SIMONDS CANADA ABRASIVE CO., LTD., ARVIDA, QUEBEC



GOSS and DE LEEUW
AUTOMATIC CHUCKING MACHINE



means a complete piece... at each index cycle

When a piece is finished it is *completely* finished without the necessity of a second operation. Furthermore it means *more* finished pieces in a given period of time and greater accuracy in *every* finished piece.

The "1-2-3" Method is exclusive with Goss & DeLeeuw. With it, three ends of a piece can be machined at a single chucking of the work, simultaneously or in sequence depending on the operations involved. It will pay you to investigate.

Send for illustrated literature giving detailed information. Send samples and ask us to give you cost estimates of handling this work on a "1-2-3" Goss & DeLeeuw Automatic Chucking Machine.

GOSS & DeLEEUW — QUALITY PRODUCT-QUANTITY

GOSS and DeLEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

NEW BOOKS

BUTTRESS SCREW THREADS—AMERICAN STANDARD ASA BL. 9-1953. *Published by American Society of Mechanical Engineers, 29 West 39th St, New York 18. Paper backed, 17 pages. Price $1.*

In 1888, the *Journal of the Franklin Institute* described the buttress thread, but it is so little used that standardization activities did not start until 1942. Research then showed that designers were calling for a pressure flank angle of 0 to 15°, and a trailing flank angle of 30 to 55°. By international agreement with the British and Canadians the pressure flank angle is established at 7°, the trailing flank angle at 45° and the basic depth of engagement at 0.6 pitch. The buttress thread is used mostly for military applications, such as breech mechanisms.

•

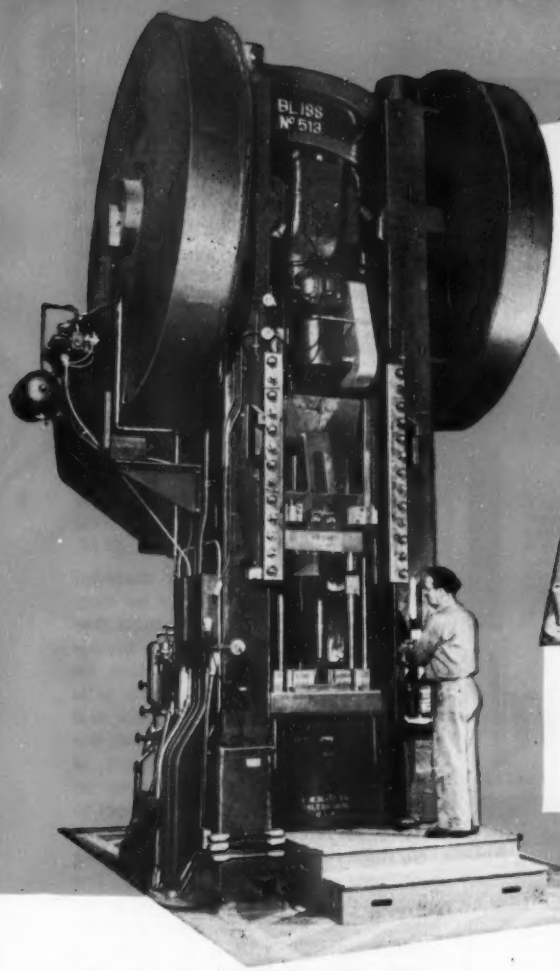
PROTECTIVE ATMOSPHERES.—*By A G Hotchkiss and H M Webber, Industrial Heating Dept, General Electric Co. Published by John Wiley & Sons, Inc. 440 Fourth Ave, New York 16. 341 pages. Price $7.*

By special permission of the publishers, *AM* readers were given a foretaste of this book last year, for the report "How to Cure Protective Atmosphere Troubles" (*AM*—June 8, 1953, p153) was derived from Chapter Nine.

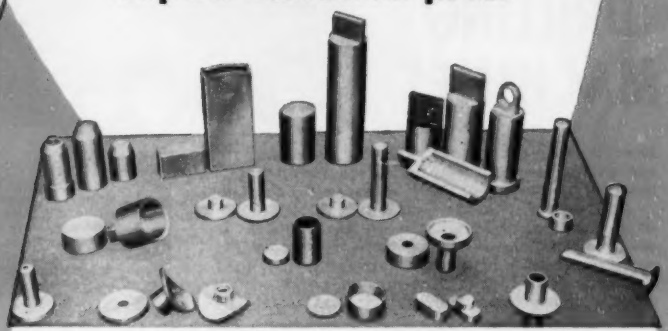
The Special Report was published because it provides manufacturing men with an excellent check list of causes and cures for protective atmosphere troubles, plus supplementary information on tests to determine the reasons for malfunctioning of the equipment.

Obviously, this preprinted chapter is not the only valuable feature of the book. The authors have brought together information from considerable personal experience plus that of others at General Electric and else-

"I prefer whole wheat bread. It doesn't show finger marks as bad as white."



Lockheed relies on this BLISS 1000 TON impact extrusion press



to produce high-strength aluminum alloy parts like these

and saves thousands over conventional machining methods

This press, largest of its kind in the aircraft industry, has saved Lockheed up to 75% in time as compared to machining, and up to 90% in material.

In fact, Lockheed engineers estimate that transfer of only 15 parts from conventional machining to impact extrusion will mean savings of $52,000 a year.

Lockheed's experience proves the importance of picking the right press for the job. And we honestly believe that our engineers are best equipped to help you make that choice. In representing Bliss—who makes more types and sizes of mechanical and hydraulic presses than any other company—they represent the world's largest press builder. Unparalleled skills and experience stand behind each Bliss press recommendation.

If you have a press problem—from a single press to an entire press room—consult a Bliss engineer or write directly to address below.

BLISS on your press is more than a name... it's a *guarantee*

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Three-unit 32-spindle machine drills 32 holes simultaneously in cast-iron meter housings at rate of 240 parts per hour.

Meet high production requirements with Bradford automatic or semi-automatic cam feed machines. Use them for drilling . . . tapping . . . boring . . . reaming . . . spot facing . . . hollow milling . . . other operations. They can be furnished with single spindle or multiple spindle drill heads with fixed or adjustable center distances . . . arranged around special Bradford fixture designed to take work quickly, position it accurately. Safety clutch prevents overload.

Bradford machines are available with any 1 to 5-hp NEMA motor . . . spindle speeds from 100 to 2500 rpm.

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Illustrated is a Greaves 2H Universal Milling Machine equipped with a Gusher Coolant Pump—Courtesy Greaves Machine Tool Co. div. J. A. Fay & Egan Co., Cinti.

Your Gusher Coolant Pump is designed to give you maximum performance in minimum space. Pre-lubricated heavy-duty ball bearings, electronically balanced rotating shaft, with no metal to metal contact in the pump, assures you of dependable service and an absolute minimum of maintenance attention. Write for full information today.

THE RUTHMAN MACHINERY CO.

1818 Reading Road, Cincinnati, Ohio

where. The whole has been written into a straight-forward text. Purpose of the book, of course, is to acquaint manufacturing men with the various kinds of protective atmospheres, how to select the best atmosphere for a given application, details of gas generators, furnaces and control equipment. With this background of knowledge, the reader is better equipped to eliminate spoiled work and production delays.

•

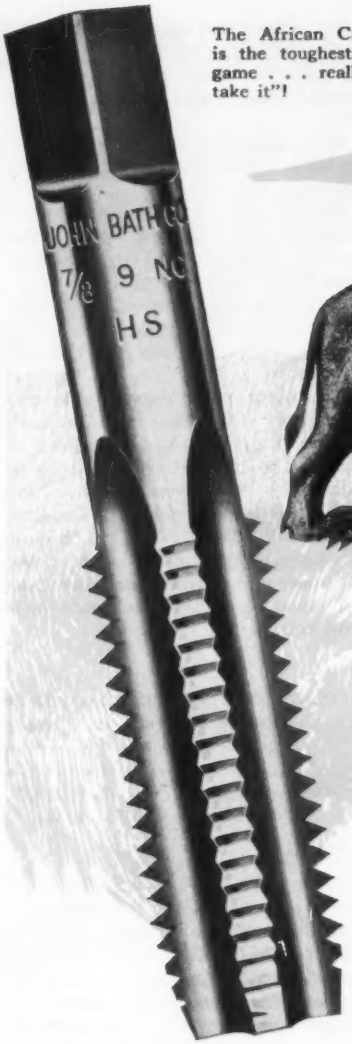
MATERIALS AND PROCESS (SECOND EDITION)—*By James F Young, Major Appliance Div, General Electric Co. Published by John Wiley & Sons, Inc, 440 Fourth Ave, New York 16. 1047 pages. Price $8.50.*

The problem of selecting material for a piece of apparatus is no easy matter. Data on metals are most frequently presented from the metallurgist's standpoint. Information on manufacturing methods usually tells how to accomplish the process and operate the equipment. However, the crux of the designer's problem is making a sound selection based on suitability of a material in respect to its properties, availability in the right form, adaptability to processing methods available, and costs. The first edition was written to help the young engineer with these matters and took its place in the series of books written for the General Electric engineering educational programs.

In preparing the current second edition, the author sought to maintain the basic concept of the book as outlined above. But in organizing the material for textbook and reference use he has sought to accomplish these objectives:

1. To make the book suitable for use by students and practicing engi-

"Don't worry, Franklin. We'll just hold this batch you just finished until we find someone who wants 250,000 screws with no heads!"



The African Cape Buffalo is the toughest of all big game . . . really "built to take it"!

RUGGED!

Bath Taps are "built to take it" too — during the daily grind of screw machine operation or, on intricate threading jobs that require special handling.

Records prove that a Bath Tap has produced 160,000 malleable iron union ring nuts at a surface speed of 120 feet per minute — that takes "guts" — the kind you need in today's assembly line production.

Rugged Bath Tap performance is dependent on these four essentials:

1. Experienced engineering and design.
2. Best quality basic steel.
3. Heat treating "know how".
4. Controlled methods of procedure.

Anyone can buy steel to specifications — but the real secret of rugged Bath Tap production is in the many years of experience in proper steel selection, heat treating, grinding, finishing . . . in the perfection of every controlled step of manufacture, plus the advantage of exclusive Bath equipment.

For taps that can "take it" — depend on Bath for long life and reliable service. Our representative will be glad to call and discuss your tapping and gaging problems.

Bath engineers check every detail, to see that all Bath Taps are conditioned to do the best threading job for your requirements.

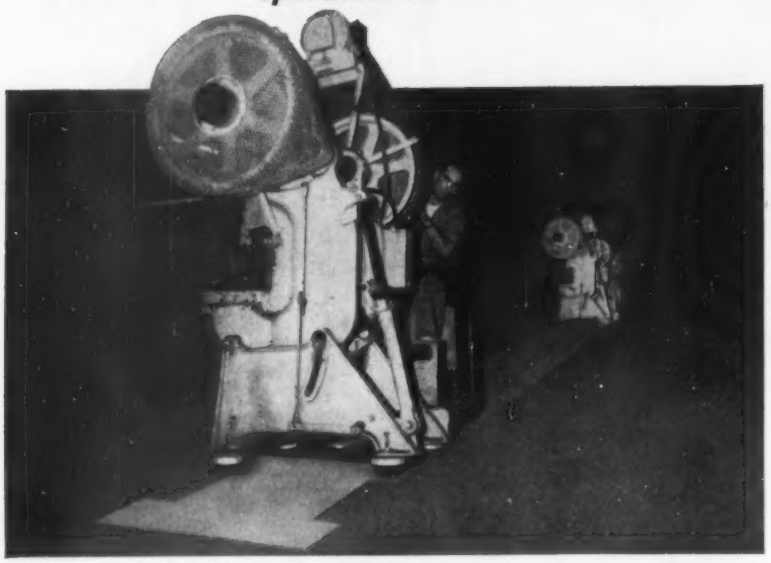
Insist on BATH TAPS for BETTER THREADS

JOHN BATH & CO., Inc.

28 Grafton St., Worcester, Mass.

PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

Production line is MOVED 200 feet and put in operation in 23 minutes



Here's what happened...

IN A RECENT DEMONSTRATION

A production line of eight punch presses was moved to another location in a plant. The machines were set down, leveled, connected to air and electrical lines, and tools and dies inserted. All eight machines were producing parts in an elapsed time of 23 minutes. The new Leveling Barrymounts made this possible, because Barrymounted machines do not have to be shimmed and lagged to the floor. *The machines mounted on them will not walk.*

In contrast, another punch press was moved to the work area and positioned. It was then lagged to the floor and shimmed in the conventional manner. Total time, over 33 minutes for this one machine, compared to an average of *3 minutes per machine* when mounted on Barrymounts.

this *mobility* increases your profits because:

- Production lines can be quickly rearranged to improve work flow, or to meet product changes.
- Machines can be quickly moved to departments where they are needed.
- Machines can be quickly moved to central tool rooms for re-tooling or repair.
- Valuable floor space can be freed for production by moving idle machines out of the way.
- Inevitable mistakes in initial plant layout can easily be corrected.

Write TODAY for your free copy of "LOOK — NO LAGGING!" and learn what the new Leveling Barrymounts can mean in profits to YOU.

THE BARRY CORP.

703 PLEASANT ST., WATERTOWN 72, MASSACHUSETTS

SALES REPRESENTATIVES IN

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neers, particularly the latter having responsibilities in production development, design, production, processing, quality and product application.

2. To expand the coverage of nonmetallic materials and constructional materials.

3. To bring the presentation up to date, especially to incorporate the latest developments in physical metallurgy and chemistry.

4. To develop a "sense of proportion," so necessary in engineering by adding property data and process tolerances.

It is evident that considerable care and effort have been expended both by the author and contributors to realize these objectives in a book of reasonable size. Even so, the second edition is 50% larger than the first. This book certainly is a worthwhile addition to the library of both the engineer and others in metalworking who want to know the basic facts and keep up with progress.

•

ELEVATED TEMPERATURE PROPERTIES OF CHROMIUM-MOLYBDENUM STEELS —*Special Technical Publication No. 151. Published by the American Society for Testing Materials, 1916 Race St, Philadelphia 3. 212 pages. Price $4.75*

This is the second in a series of reports prepared under the auspices of the Data and Publications Panel of the ASTM-ASME Joint Committee on effect of temperature on the properties of metals. This report is a graphical summary of the elevated-temperature strength data for the chromium-molybdenum steels. It includes summary curves for tensile strength; 0.2% offset yield strength; per cent elongation and reduction of area; stresses for rupture in 100, 1000, 10,000, and 100,000 hr; and stresses for the creep rates of 0.0001 and 0.00001% per hr (1% in 10,000 and 100,000 hr); and Larson-Miller master curves (sometimes called the "parameter" method).

The data sheets also include the chemical composition, processing data, heat treatment, and other pertinent information about the steels included in this survey. Among the compositions covered with charts and tables are:

½ Mo	3 Cr-1 Mo
Ni-Cr-Mo	5 Cr-½ Mo
1 Cr-½ Mo	5 Cr-Mo Ti
1 Cr-Mo V	5 Cr-Mo Si
1¾ Cr-½ Mo	7 Cr-½ Mo
2 Cr-½ Mo	9 Cr-½ Mo
2¼ Cr-1 Mo	

DUMORE® ANNOUNCES THE

NEW Series 35 PRECISION handgrinder

(35,000 RPM)

. . . for use with tungsten carbide mills, high-speed cutters, mounted wheels and points, abrasive bands, etc.

Voltage—115V or 230V AC-DC
Current — 3.0 amps
Horsepower — ¼
Speed, no load — 35,000 rpm
Duty cycle — continuous
Bearings — 3 sealed, micro-precision ball
Winding connection — series
Ventilation — internal fan
Temperature rise — 40° C
Finish — grey
Weight — 3 lbs., 3 oz. with cord 2 lbs., 11 oz. without cord
Length — incl. chuck 10¾"
Small dia. — 1 5/16"
Body dia. — 2 7/16"

THIS "midget miller" offers you an economical solution to a host of grinding, milling, finishing and polishing jobs on materials ranging from wood to hard alloy steel. Powered by a ¼ hp *continuous-duty-rated* Universal motor, it's available for 115V or 230V DC or AC, 0-60 cycle operation.

Three micro-precision bearings seated in steel inserts cast into the grinder housing, assure lasting accuracy on close tolerance work. ⅛" or ¼" collet chucks available.

For complete details, see your Industrial Distributor, or write —

Also brand NEW...

the DUMORE Super-10

Voltage — 115V AC-DC
Current — 1.4 amps
Horsepower — 1/10
Speed, no load — 22,000 rpm
Duty cycle — continuous
Bearings — 3 sealed, precision ball
Winding connection — series
Ventilation — internal fan
Temperature rise — 40° C
Finish — grey
Weight — 3 lbs., 1 oz. with cord; 2 lbs., 10 oz. without cord
Length — incl. chuck 10¼"
Small dia. — 1 5/16"
Body dia. — 2 7/16"

Here's a better-balanced, completely redesigned, new version of the popular Dumore Series-10 handgrinder. Powered by a 1/10 hp continuous-duty-rated Universal motor, it's recommended for both tool and die work where accuracy is a must and production bench work where full shift operation is necessary. It's a real hog for work.

DUMORE PRECISION TOOLS

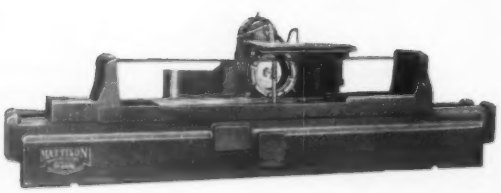
THE DUMORE COMPANY

1337 Seventeenth Street • Racine, Wisconsin

Builders of precision line of Grinders, Automatic Drill Heads, Tool Post Grinders, Drill Grinders, Light Drilling Equipment, Flexible Shaft Tools, Hand Grinders, Fractional hp Motors and Gear Motors

WATCH FOR A THIRD IMPORTANT ANNOUNCEMENT NEXT MONTH!

Grinding matching surfaces of connecting rods on Mattison 4000 Face Grinder at Caterpillar Tractor Co.



Matching surfaces of connecting rods are accurately ground on a high productive basis on the Mattison No. 4000 Face Grinder. A special hydraulically operated fixture holds rod and cap in position.

Mattison Face Grinders will handle a wide range of work and are profitably used in virtually all industries — metal working, railroad shops, paper and pulp mills, terra cotta and rubber plants, steel mills and foundries. Ask us for free copy of bulletin 846-2RM for further information on our complete line of Face Grinders.

MATTISON MACHINE WORKS

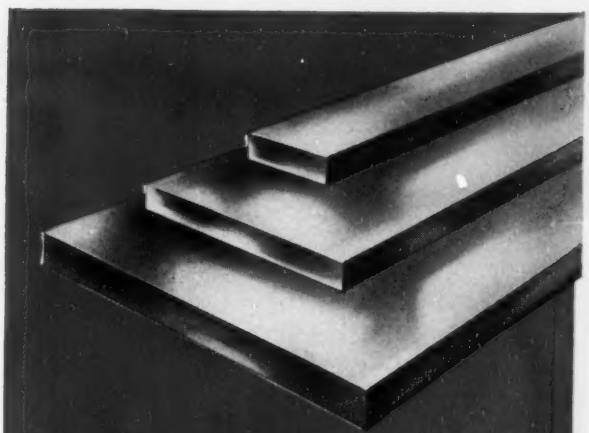
ROCKFORD · ILLINOIS

Mon!—there's thrift!

You can Save time . . . trouble . . . money with J&L Wide Cold Rolled Flats

J&L Wide Cold Rolled Flats save you time, trouble, and money in replacing forgings, expensive castings, or parts ordinarily made from hot rolled plates planed to size.

In such applications as stripper plates, backing plates for dies, die plates, punch pads, jigs and fixtures, plate and die molds, pattern plates, and other machinery parts J&L Cold Rolled Flats offer the following outstanding advantages:



1. **THEY REQUIRE LESS MACHINING** (they are true to size and section).
2. **THEY NEED LESS FINISHING** (they have a smooth, cold rolled surface).
3. **THEY ELIMINATE FABRICATING OPERATIONS** (they are available in a wide range of widths and thicknesses).

RANGE OF SIZES: Widths—up to 14⅝"
Thicknesses—⅛" to 2"

Order J&L Wide Cold Rolled Flats from your local J&L Distributor.

J&L STEEL

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

40,000 lb. ERIE STEAM HAMMER
Increases Production at Kropp Forge Company

PART of the Kropp Forge Company's $5,000,000 expansion program is this 40,000 lb. Erie Steam Drop Hammer making aircraft forgings. Well known for top quality forgings, Kropp is meeting today's all-time high forgings demand with greatly expanded facilities . . . in which Erie Hammers play a major part. Forgings are as good as the hammergangs and hammers that make them. Kropp's choice of Erie Hammers recommends them highly to you. Write for Bulletin 340 giving complete details on Erie Steam Hammers.

ERIE

ERIE FOUNDRY COMPANY ERIE, PENNSYLVANIA

Dependable FORGING HAMMERS • HYDRAULIC PRESSES

Announcing the POWRWORKER "26"

Feature by feature, it's engineered to meet your own handling requirements

Detailed job-studies in customer plants, warehouses and terminals dictated the features of the POWRWORKER "26". No truck on the market today can match the POWRWORKER'S combination of *user-benefits:*

- **Maximum Maneuverability**—Only 26" longer than the load, the shortest standard truck on the market.
- **Light Weight**—Completely fabricated construction combines maximum strength with least weight.
- **Stability**—Close-to-the-floor, low center of gravity.
- **Great Efficiency**—Double reduction of spur gears gives maximum ton-miles at least power cost.
- **Balanced Load Distribution**—Double lift cylinders for smooth lifting and lowering.
- **Safety**—Deadman switch cuts power when brake is applied, handle automatically returns to brake-position.
- **Easy to Service**—All operating units accessible without lifting or dismantling. Drive wheel tire is quickly demountable.

We invite you to compare the 1954 POWRWORKER with any truck on the market! For details, call your local Clark dealer, listed in the Yellow Pages. Or send the coupon for literature.

Ask your Clark dealer about Clark's low-cost Pay-As-You-Go leasing plan.

CLARK EQUIPMENT

POWRWORKER SECTION
Industrial Truck Division
CLARK EQUIPMENT COMPANY
Battle Creek 3, Michigan

☐ Please send POWRWORKER literature. ☐ Have representative call.

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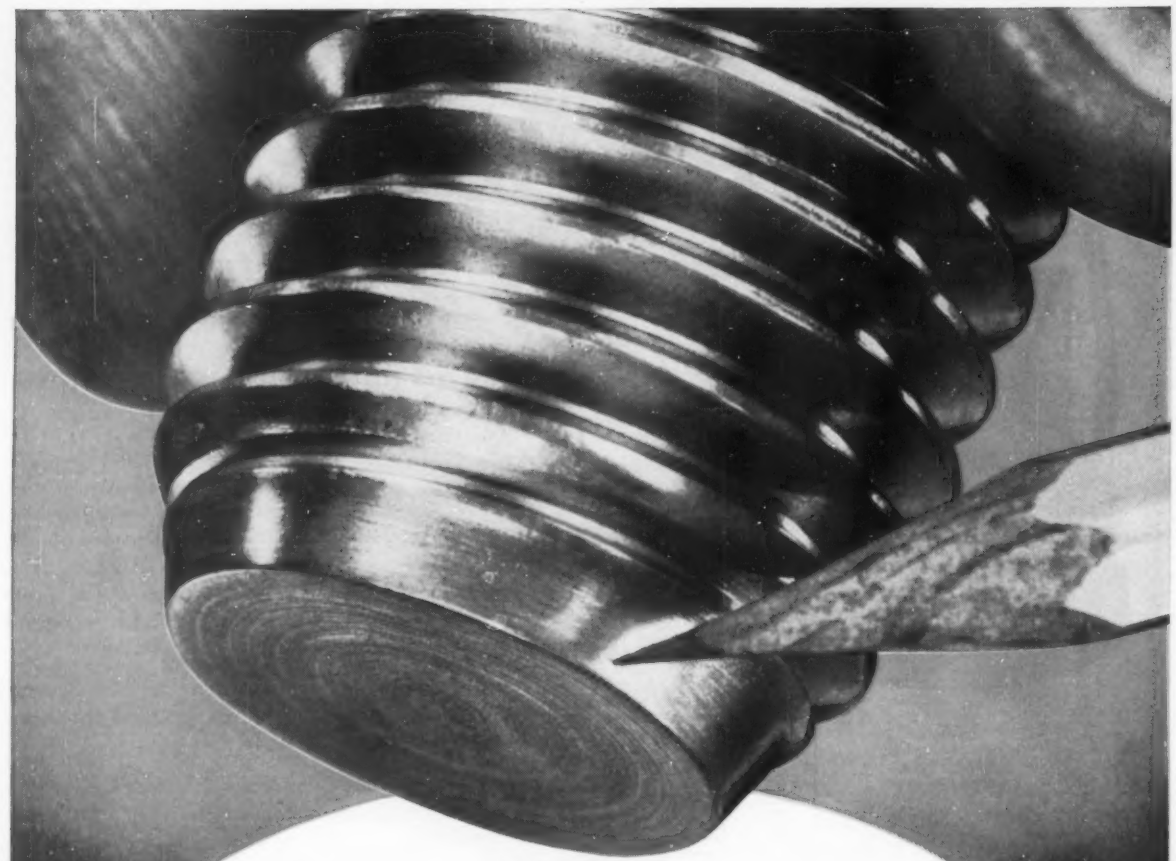


NEW

Allen leader point cap screws

Dropping, knocking against metal surfaces and faulty line-up are major causes of damaged threads. Allen's new unthreaded leader point substantially reduces the causes of screw thread injury, or damage to threaded holes. Grip Heads, precision fit sockets that adhere to the key, *plus* the new leader points, make Allens the world's easiest starting cap screws, particularly in inaccessible spots. Sold *only* thru leading Industrial Distributors.

ALLEN
MANUFACTURING COMPANY
Hartford 2, Connecticut U.S.A.

Tool Steel Topics

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM TOOL STEEL ENGINEER SAYS:

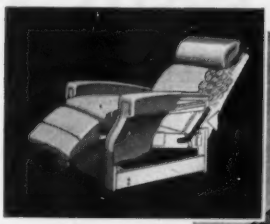
Pack-hardening Tools? It's Best to Use a Thermocouple

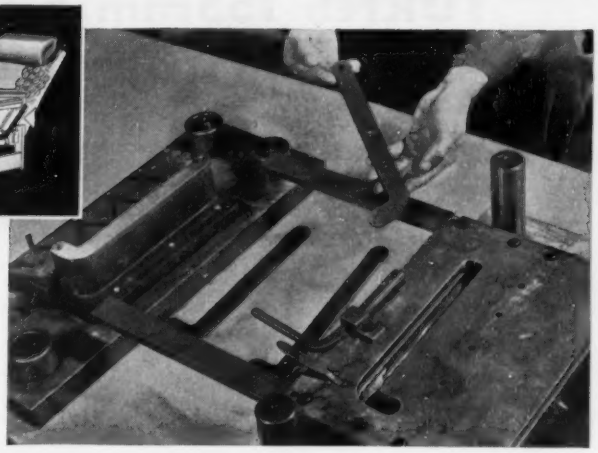
In shops which do not have controlled-atmosphere furnaces, you will sometimes find it desirable to pack-harden the tools, so as to avoid both excessive scaling and decarburization.

This can be accomplished by packing the tools in sealed containers prior to charging in the furnace, using protective materials such as cast-iron chips, wood charcoal, or spent carburizing compound. However, in following this procedure, this precaution is important: do not permit any of the tools to come in contact with the container.

Heating through the pack is a slow process at best, and for this reason it is often difficult to make a close estimate of the length of time required for proper heating. We therefore recommend that a thermocouple be inserted in the pack, close to the tools.

After the tools have been heated the proper length of time, they may be removed from the pack, then quenched in the usual manner. If a controlled-atmosphere furnace is not available, pack-hardening should always be used on those steels which have a quenching temperature in excess of 1650 F. This does not hold true, however, in the case of high-speed and hot-work steels.





Inset (above) shows type of chair in which back hinge is used. The BTR die, together with the hinge, is shown at right.

BTR BLANKING DIE MAKES PART FOR MECHANISM OF BARCALOUNGER CHAIR

At the busy plant of Barcalo Manufacturing Co., Buffalo, N. Y., they're turning out, among other things, a back hinge which is used in the tilting mechanism of the popular Barcalounger chair.

The operation, performed by a blanking die in a 200-ton press, involves two steps—punching five small-diameter holes in 3/16-in. sheet steel, then blanking the hinge to size. The die, made of BTR, is hardened to Rockwell C58-60. It is giving a good account of itself because of its resistance to the shock encountered. And as for wear, the die is expected to last and last, for with 6000 pieces produced daily, its use is required only periodically.

BTR (Bethlehem Tool Room) is our manganese-chromium-tungsten grade of oil-hardening tool steel, well known for its safe-hardening property.

Typical Analysis:

Carbon	0.90	Vanadium	0.20
Manganese	1.20	Tungsten	0.50
	Chromium 0.50		

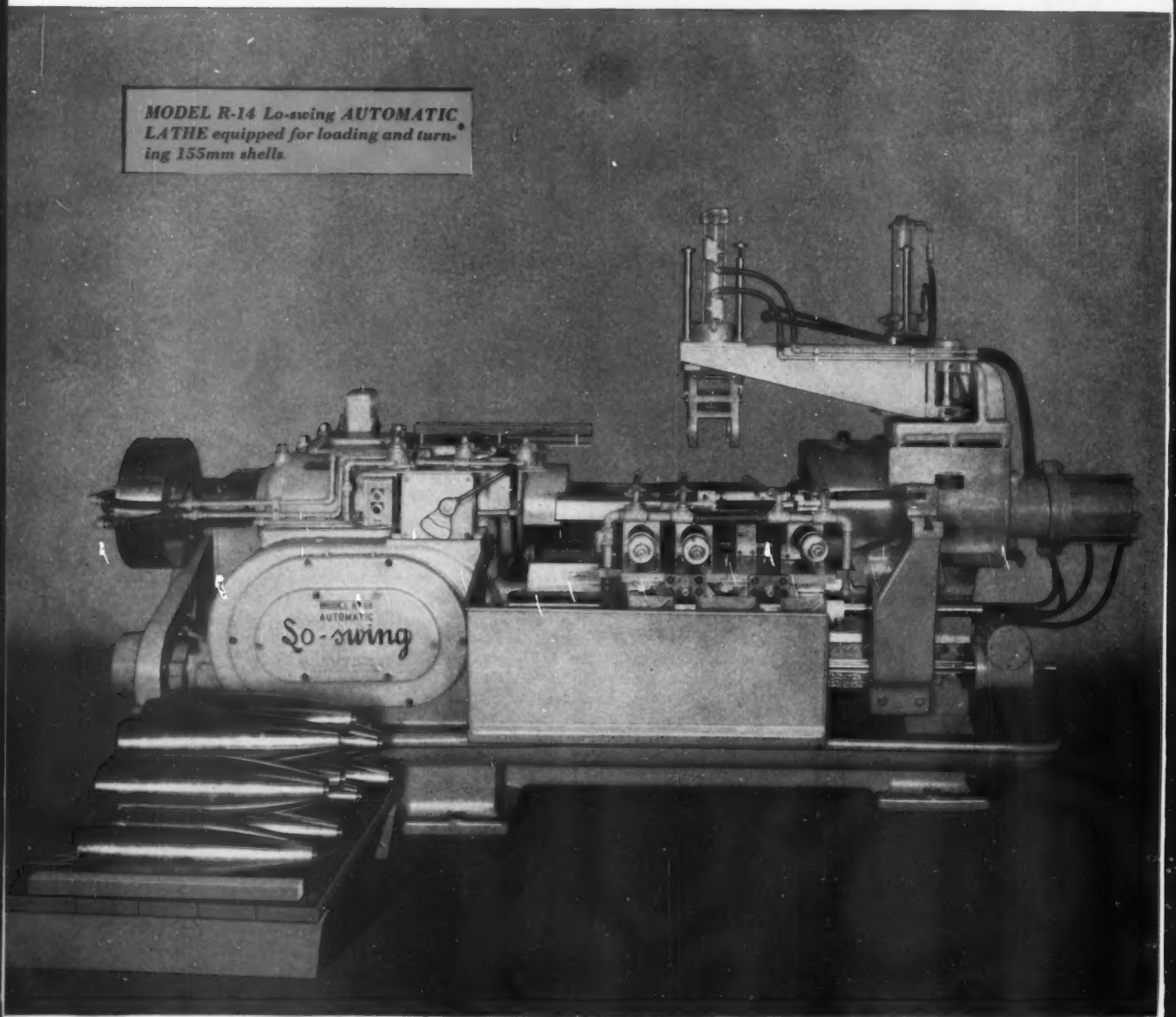
If you have a job calling for a safer hardening steel than carbon tool steel—such applications, say, as blanking, cold-forming, and bending dies, forming rolls and the like — it's hard to beat BTR.

Lehigh S Increases Life of Burnishing Rolls

This picture shows the burnishing of a freight car axle to provide a smooth, mirror finish. Two rolls, at right angles to the work and applied with about 400 psi pressure, cold-roll the axle simultaneously. The rolls are made of Lehigh S (our oil-hardening type of high-carbon, high-chromium tool steel), hardened to Rockwell C-62. They burnish 60 axles in 8 hours, and have a service life of about six months. With grades formerly used, the maximum service life was two months.

MACHINE OF

MODEL R-14 *Lo-swing* LATHE FINISH TURNS 155mm SHELLS AT HIGH PRODUCTION RATE

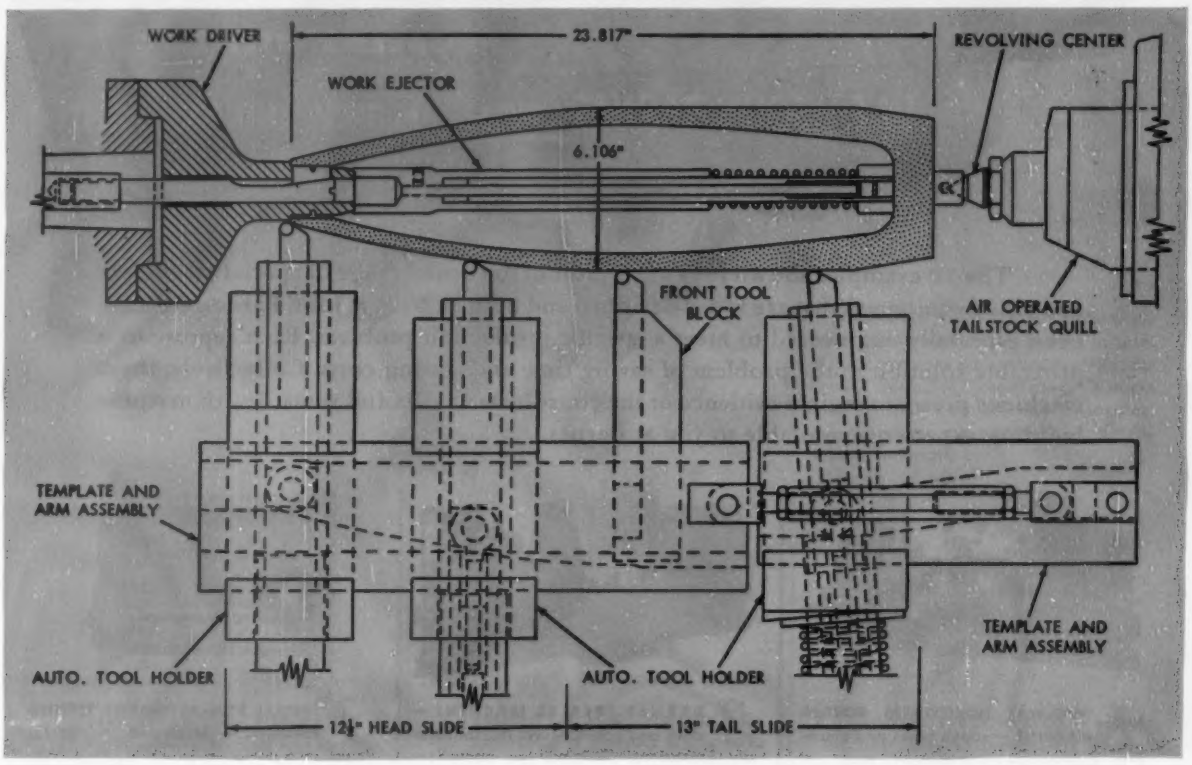


MODEL R-14 Lo-swing AUTOMATIC LATHE equipped for loading and turning 155mm shells.

PRODUCTION COSTS

THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



PROBLEM: To finish turn the contour of 155mm shells and provide other than manual means for loading and unloading work.

SOLUTION: The Model R-14 Lo-swing Automatic Lathe was selected for this job as it provides the necessary rigidity and power to handle multiple cuts at high cutting speeds with carbide tools.

The illustration opposite shows the fully-equipped lathe and several finished work pieces. The line drawing above shows the heavy duty contour turning attachments and the two-step template used for duplicating the profile of the shells. The shell is driven with a special air-operated, three-jaw driver and location is taken from the finished face of the nose of the shell.

The problem of loading and unloading the shells, which are too heavy for an operator to handle, was solved with the double-arm, pneumatically-operated loader shown in the illustration. Rough shells are delivered at the rear of the machine on a conveyor. In position No. 1, one arm of the loader is directly above this conveyor and, when lowered, picks up a rough shell, while the other arm picks up a finished shell from between centers. The operator then throws the air control valve, which raises the loading device and swings it through 90° to No. 2 position, delivering the rough shell between centers and the finished shell to a second conveyor, located at the front of the machine, which leads to the next operation.

The shells are automatically released from the driver nose by the spring loaded ejector, the details of which are shown in the line drawing. In operation, the loader fingers are first clamped around the finished shell and, as the tailstock center is retracted, the spring loaded ejector forces the shell clear of the driver nose.

Seneca Falls engineers are at your disposal for a solution of all turning problems.

ARE LOWER WITH *Lo-swing*

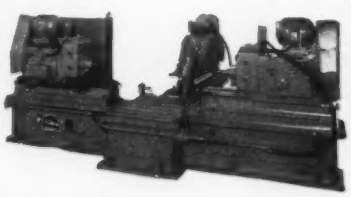
10 solutions

TO DIVERSE PRODUCTION PROBLEMS WITH

W. F. & JOHN BARNES SPECIAL MACHINES AND EQUIPMENT

The 10 examples shown here are typical of the broad range of special machinery and allied equipment that are today designed and built at W. F. & John Barnes. All have been especially engineered to meet a specific production problem. Each represents a profitable solution to the problem of saving time and cutting costs. Collectively, these machines present tangible evidence of the coordinated skills and versatility of machine building experience available to you at Barnes.

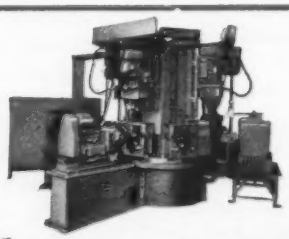
1 **TWO-WAY HORIZONTAL BORING MACHINE** — rough bores and chamfers automobile transmission cases at 82.5 pieces per hour (80%). This unit completes 18 operations.



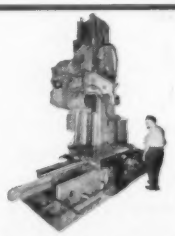
2 **BARNES SPECIAL MACHINE** — drills and counter-sinks Tractor Spindle Extensions. Performs ten operations with pieces completed at the rate of 19.5 per hour (80%). Center head has 4-spindle cluster arranged for pivoting to provide adjustable spindle pattern.

3 **SPECIAL SEMI-AUTOMATIC TESTING MACHINE** — developed to test for leaks in automotive power steering castings. Four castings are inspected with each machine cycle. Workpieces are loaded and unloaded manually . . . all other operations are performed automatically.

4 **AUTOMATIC RETORT LOADING MACHINE** —one of a variety of special equipment, such as glass handling machines, can unloaders, carton uncasers, and special conveyors, designed and built by Barnes for the food, chemical, and beverage industries.



5 **BARNES 6-STATION CENTER COLUMN MACHINE** — with 72″ diameter indexing table, completes 18 operations per piece, 118 pieces per hour, on Cast Aluminum Transmission Extension Housings in a large automotive plant.

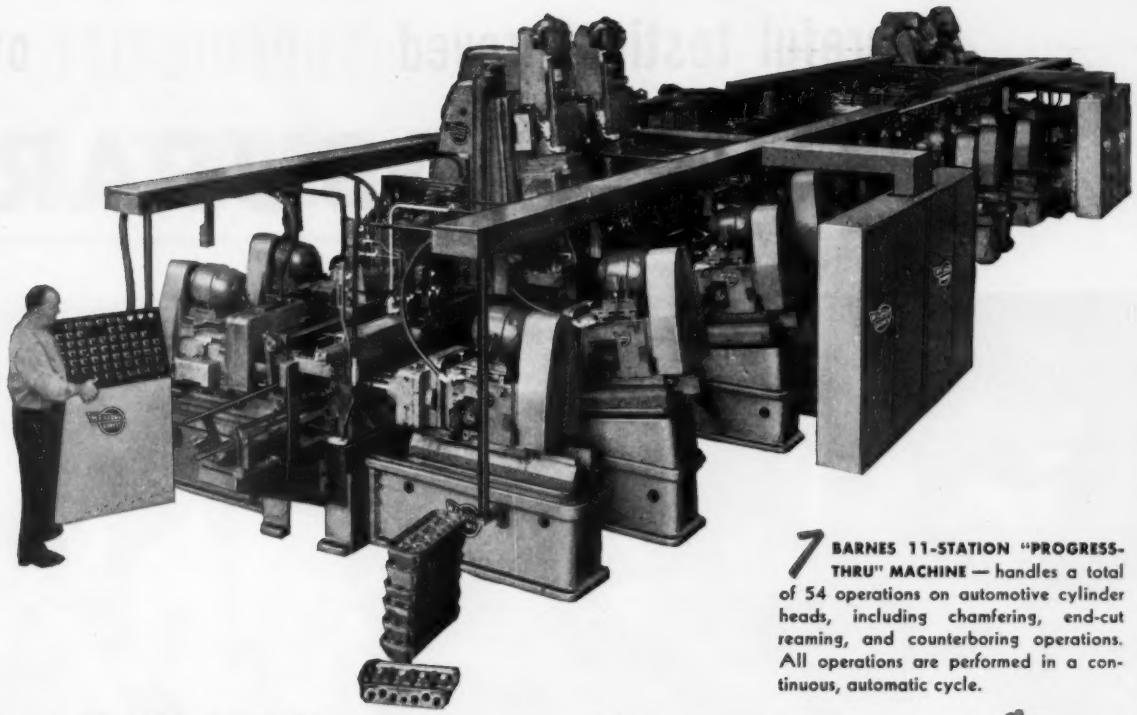


6 **SPECIAL VERTICAL SINGLE-SPINDLE MILLING MACHINE** — with 72″ saddle, slab and face mills mounting pads on a variety of motor frames. Quick setup features enable 6½ pieces to be completed per hour.

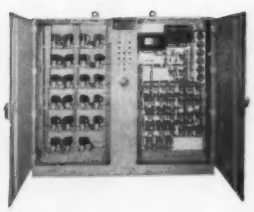
W. F. & JOHN BARNES

BUILDERS OF BETTER MACHINES SINCE 1879

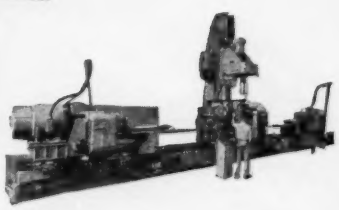
MULTIPLE SPINDLE DRILLING • BORING • TAPPING



7 **BARNES 11-STATION "PROGRESS-THRU" MACHINE** — handles a total of 54 operations on automotive cylinder heads, including chamfering, end-cut reaming, and counterboring operations. All operations are performed in a continuous, automatic cycle.



8 **ELECTRICAL CONTROL PANEL** — automatically controls regeneration and service operations on two sets of deionizing tanks, alternating units for a constant supply of treated water . . . one of countless applications where Barnes Electrical Controls add efficiency and economy to everyday industrial operations.



9 **SPECIAL TWO-WAY VERTICAL AND HORIZONTAL BORING MACHINE** — rough, semi-finish, and finish-bores, chamfers, and faces Final Drive Housings. Spindles automatically change speeds and feeds to meet boring and facing requirements.

10 **APRON-TYPE CONVEYOR** — especially designed for efficient removal of chips from machines used in a large automotive plant. Barnes Conveyors have been designed and built for a wide variety of applications.

BARNES SPECIAL MACHINE TOOL BUILDING SERVICE INCLUDES...

SPECIALIZED MANUFACTURING FACILITIES — 75-year background, large well equipped plant efficiently tooled to produce high production machines.

SPECIAL HYDRAULIC EQUIPMENT — designed and built to meet JIC standards. Individually engineered units assure smooth, dependable actuation for every requirement.

SPECIAL ELECTRICAL EQUIPMENT and CONTROLS — individually designed and built for maximum safety and ease of control with circuits that assure the most dependable coordination of all machine functions.

SPECIAL GAUGES, FIXTURES, TOOLS — designed for each individual machining problem, assure accuracy of operations at high production speeds.

SPECIAL HANDLING AND CONVEYOR EQUIPMENT — designed and built to reduce work handling, effect maximum safety and efficiency.

COORDINATED DESIGN AND ENGINEERING — Mechanical, Hydraulic, Electrical, Process, Tool, and Fixture Engineers work together at Barnes. Teamwork solves complex problems quickly.

Write **FOR FREE DATA**

"Coordinated Machine Engineering" — a free booklet describing modern machines and mass production technique. Write for your free copy today.

W. F. & JOHN BARNES COMPANY • 314 SOUTH WATER ST., ROCKFORD, ILLINOIS

MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

careful testing proved SUPERIORITY of

GULF LASUPAR

Mr. Raymond St. John, inspector, and a Gulf Sales Engineer discuss results with Gulf Lasupar Cutting Oil in machining bevel gears.

A close-up view of bevel gear cutting, showing Gulf Lasupar Cutting Oil in action.

CUTTING OIL

for every cutting operation at Belock Instrument Company, Long Island, New York

Belock wanted a cutting oil that would produce precision instrument parts to extremely close tolerances, and give an excellent surface finish with as few tool changes as possible.

After careful tests, using many kinds of cutting fluids, they found that Gulf Lasupar Cutting Oil gives them better performance over their entire range of machining operations on the many types of steel they process.

In Gulf Lasupar Cutting Oil you get three degrees of sulphur activity, each designed to provide better protection for the tool and to insure a better finish under a given set of machining conditions—(1) extremely active free sulphur held in a stable solution, (2) sulphur combined with mineral oil by a special Gulf process, and (3) sulphur combined with fatty oil.

A Gulf Sales Engineer will be glad to demonstrate the advantages of Gulf Lasupar Cutting Oil in your plant. You will find him always "on call" at your nearest Gulf office.

A Bechler Swiss Automatic Screw Machine Cutting A.I.S.I. 416 Stainless Steel. These Gear Blanks are held to tolerances of .0003 of an inch.

GULF OIL CORPORATION
GULF REFINING COMPANY
1822 GULF BUILDING
PITTSBURGH 30, PA.

GULF SERVES INDUSTRY

STEELWELD BENDING

Large cylindrical sections for boilers, buckets, drums, are easily made with standard bending dies.

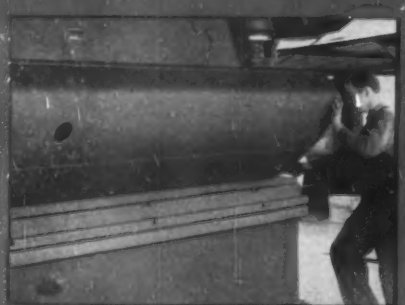
Drawers, file cases and other equipment requiring sharp bends are produced accurately and quickly.

Conical sections are quickly formed with standard bending dies by use of the ram-tapering mechanism.

Neatly rounded flanges can be formed on several panels at every stroke of the press.

With a simple attachment this model P3-10 press punches large diameter holes (5" dia. in 10-gauge and 8" dia. in 12-gauge plate) in fast time.

Corrugating and any straight-line production bending can be done to hairline accuracy.

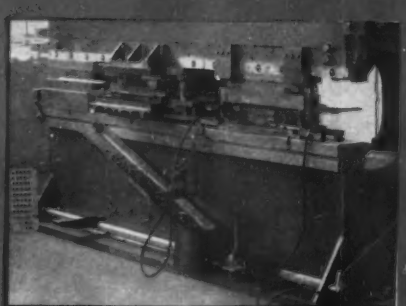


Smooth curves of practically any shape can be readily formed with standard or simple dies.

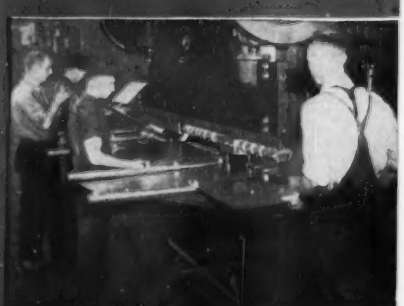
Various beading and edging operations are easily performed. Here the edge of a panel is being wrapped around a pipe for rigidity.

Producing a 6-inch diameter cylinder. Parts like this can be formed in lengths up to 20 feet.

Punching 150 holes ranging from .078" to .250" at one time is easily done on a Steelweld Press.



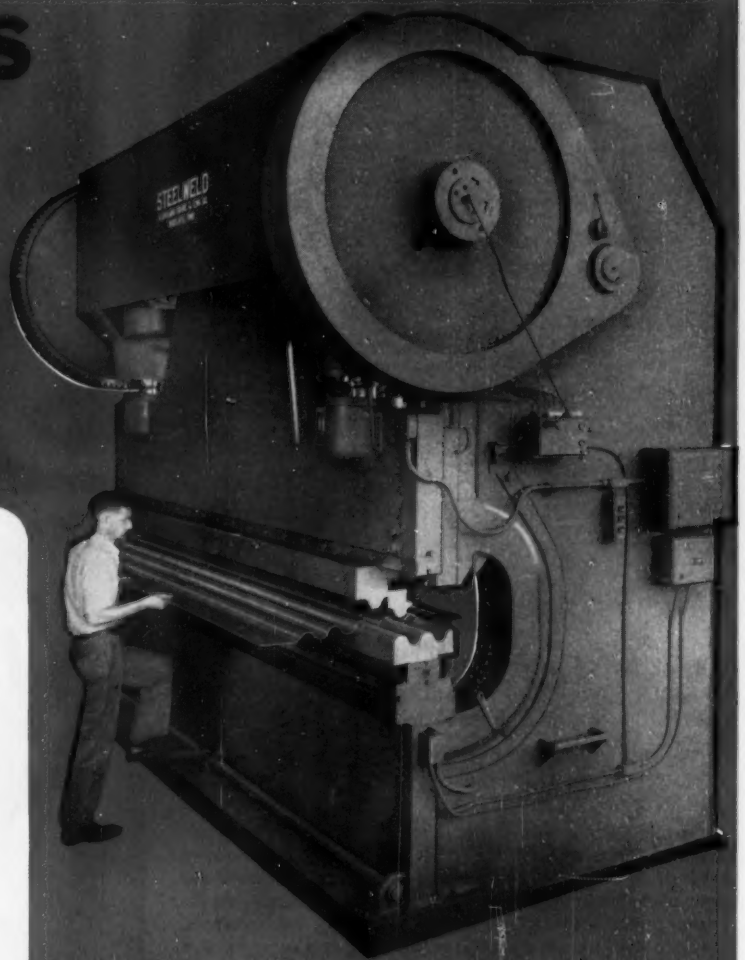
Holes are punched, corners notched and the plate finally formed with dies shown. See finished part at left.



For production runs, several forming and punching operations may be handled at each stroke of the ram.

PRESSES

Speed Production of Dozens of Varied Jobs



For anyone working with metal—steel, aluminum, dural, monel, stainless steel, etc.—in any thickness up to one inch and lengths to 20 feet, Steelweld Presses offer important advantages—advantages that can have direct bearing on the future success of a department or entire business.

They make possible easy fabrication of parts that by ordinary methods would be difficult and expensive. They speed production and lower costs because press work is fast. After easily-inserted dies are setup, parts may be formed as quickly as they can be placed into or removed from a press.

Steelweld Presses are versatile. Any of the various operations illustrated at left are easily performed on any machine.

Hundreds of Steelweld Presses are serving leading concerns in the United States and many foreign countries.

A FEW OF MANY FEATURES

1. All-welded one-piece steel frame with box-type end housings and heavy steel throat forgings.
2. Extra deep throat—18" standard. May be up to 36" for some models.
3. Six exceptionally large main bearings.
4. Clutch and brake easily adjusted without tools.
5. Smooth velvet-touch control. Ram stops with extremely little drift.

THE CLEVELAND CRANE & ENGINEERING CO.
1428 EAST 281 st STREET, WICKLIFFE, OHIO

GET THIS BOOK!
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

STEELWELD
BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

NOW Clutch Operated Models

extend the applications for

Swanson TURRET INDEXING UNITS

Swanson Series TC Unit shown with optional mounting brackets.

By providing a "packaged" intermittent-motion chassis, Swanson Turret Indexing Units save time and money in designing and building special automatic machines for precision production operations on small and medium parts.

SWANSON series TC indexing turrets differ basically from the accepted series T units only in the solenoid-operated clutch drive provided. They incorporate the same Swanson cross-over cam and locking device to assure harmonious indexing and accurate, positive positioning at all work stations. They are available in a wide range of turret diameters and work stations, with full provision for mounting operational devices of all types.

The new clutch-operated models have been developed to handle applications requiring a high variable of infinite work cycles . . . or where it is desirable to have the operator control the indexing cycles by push-button controls. Limit switches may also be provided to prevent indexing before completion of any operation cycle. Without obligation, Swanson engineers will be glad to suggest applications of these units and accessories to you. In over a third of a century, Swanson-made machines have improved quality and quantity in hundreds of manufacturing operations.

Write for Bulletin TC1

. . . See these PRECISION PRODUCTS by SWANSON
Booth 1968 ASTE Show

POWER-DI Press Units
Turntable Units
Feeding Hoppers
Memory Devices for automatic machines
V-Liner Inspection Units and Concentricity Checking Fixtures

Engineers and Builders of Special precision machinery

SWANSON
TOOL & MACHINE PRODUCTS INC., ERIE, PA.

Quality since 1919

STRENGTH WITHOUT BULK

The exceptional tensile and torsional strength of Mac-it Screws makes it possible to use smaller, lower cost screws for all fastening jobs. Mac-it Special Alloy Steel used in all Mac-it Screws is held to rigid specifications, assuring uniform and dependable screw fasteners.

PRECISION FASTENERS

The precision manufacture and quality control used in making Mac-it Screws provide users with high dimensional accuracy and uniformity. All Mac-it Screws in both coarse and fine threads are held to a class-3 fit.

MAC-IT SCREW ENGINEERING

Mac-it maintains a fastener engineering service for the design, development and production of screws to suit all types of applications.

SPECIFY Mac-it® FOR ALL THESE ADVANTAGES

ONE MAC-IT CALL GETS 'EM ALL!

SPECIAL SCREW PRODUCTS

Mac-it is geared for either large or small run production of screws with special design or strength characteristics.

HEAT-TREATING

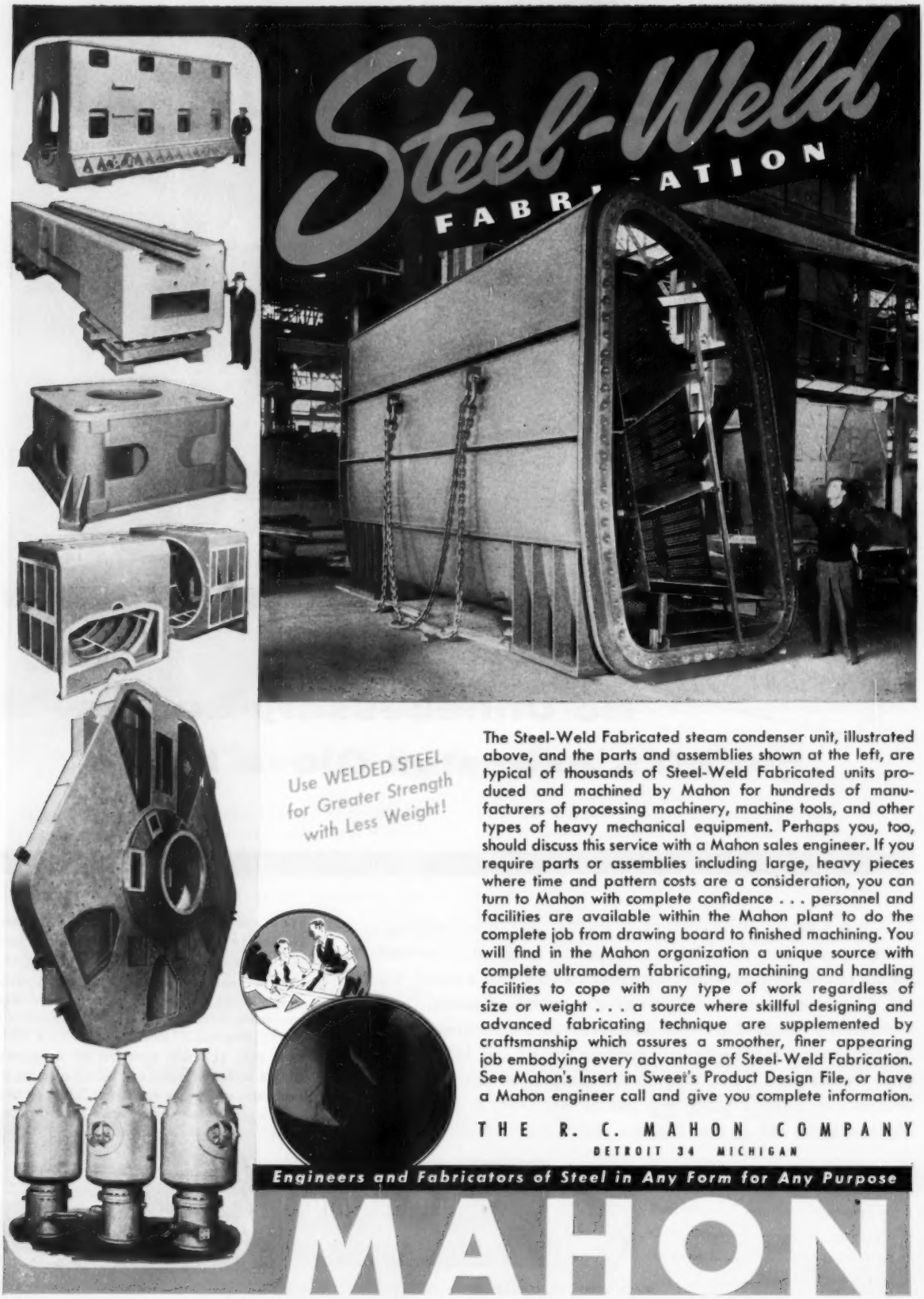
Mac-it heat-treatment is more than a mere case hardening or surface processing. The high quality of Mac-it Special Alloy Steel adapts it to heat-treatment that penetrates throughout the structure of the screw so that the center possesses the same sturdy toughness possessed by the outside. Proved formulas govern this process.

Each type Mac-it Screw is heat-treated to possess maximum strength for the particular purpose for which it is to be used. No one heat-treatment is best for all purposes.

DISTRIBUTOR SERVICE

Contact any of the hundreds of Mac-it distributors from coast to coast for immediate service to supply your requirements for standard or special screws.

MAC-IT SCREW DEPARTMENT
STRONG, CARLISLE & HAMMOND COMPANY
1392 W. 3RD. STREET · CLEVELAND 13, OHIO
Manufactured by Mac-it Parts Co., Lancaster, Pa.



Use WELDED STEEL for Greater Strength with Less Weight!

The Steel-Weld Fabricated steam condenser unit, illustrated above, and the parts and assemblies shown at the left, are typical of thousands of Steel-Weld Fabricated units produced and machined by Mahon for hundreds of manufacturers of processing machinery, machine tools, and other types of heavy mechanical equipment. Perhaps you, too, should discuss this service with a Mahon sales engineer. If you require parts or assemblies including large, heavy pieces where time and pattern costs are a consideration, you can turn to Mahon with complete confidence . . . personnel and facilities are available within the Mahon plant to do the complete job from drawing board to finished machining. You will find in the Mahon organization a unique source with complete ultramodern fabricating, machining and handling facilities to cope with any type of work regardless of size or weight . . . a source where skillful designing and advanced fabricating technique are supplemented by craftsmanship which assures a smoother, finer appearing job embodying every advantage of Steel-Weld Fabrication. See Mahon's Insert in Sweet's Product Design File, or have a Mahon engineer call and give you complete information.

THE R. C. MAHON COMPANY
DETROIT 34 MICHIGAN

Engineers and Fabricators of Steel in Any Form for Any Purpose

MAHON

514

1514

3514

INCREASED PRODUCTION BECAUSE...

No Unnecessary Seams In AO's Asbestos Glove Line!

This means greater hand comfort, more flexibility, which add up to increased production. *In high heat, comfortable hands do better work!* We set out to eliminate all unnecessary seams — and that's exactly what we did. Conventional asbestos gloves have as many as 8 seams. Our *exclusive* smartly designed patterns have reduced the number to 3. Your workers have a glove with *both* greater comfort and longer protective life! We use best grade, long-fibered asbestos in our gloves; tightly twisted yarn forms a better heat barrier; and, they're double stitched! Your nearest AO Safety Products Representative can supply you.

514 PLAIN ASBESTOS GLOVE — 14″ long. Also available 11″ long and 23″ long as Nos. 511 and 523 respectively. Try it on — see for yourself.

1514 LEATHER REINFORCED ASBESTOS GLOVE — Reinforced on palm and thumb with chrome-tanned split leather. Length 14″. Glove is also available 11″ long and 23″ long as Nos. 1511 and 1523.

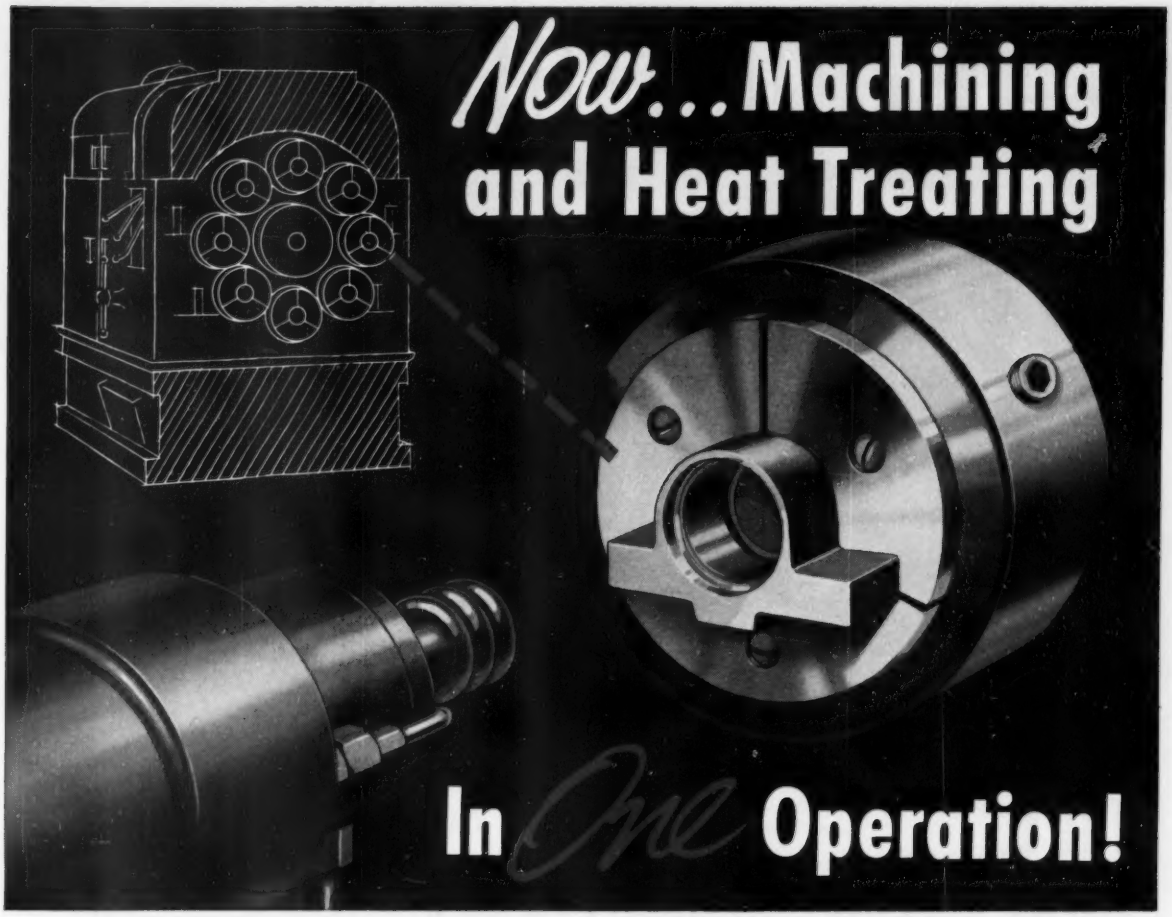
3514 FULL LEATHER REINFORCED ASBESTOS GLOVE — Ideal for hot mill work, coil tying in steel mills, and similar operations. It is reinforced on the palm and finger area with chrome-tanned split leather. Thumb covered with leather.

American Optical
SAFETY PRODUCTS DIVISION

AO SAFETY ZONE

Keep your workers in the Safety Zone with American Optical Safety Equipment

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES



with TOCCO Induction Heating

Mechanics Universal Joint Division of Borg-Warner Corporation now combines automatic heat-treating and metal-working operations on the same machine!*

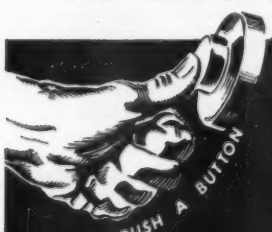
A Tocco Inductor Coil, matched to one spindle of a multiple spindle automatic screw machine, heat treats the inside diameter of automotive trunnion cups—after they have been completely formed on the same machine tool. Twenty-two, 20 and 50 kw, 450,000 cycle TOCCOtron Induction Heating units and 44 automatic screw machines (installed here and in other plants) make up this high-speed production team.

This new method permits the use of SAE 1144 steel and eliminates costly, time-consuming copper plating and carburizing operations formerly required. Heating and quenching cycles total approximately 10 seconds per part, and production is in excess of 300 parts per hour from each machine.

If your products or their components require heat treating, soldering, brazing or forging it will pay you to investigate TOCCO for better, faster ways of producing them at lower unit cost.

*This process developed and patented by TOCCO.

THE OHIO CRANKSHAFT COMPANY



TOCCO

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NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. B-3, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Hardening and Heat Treating."

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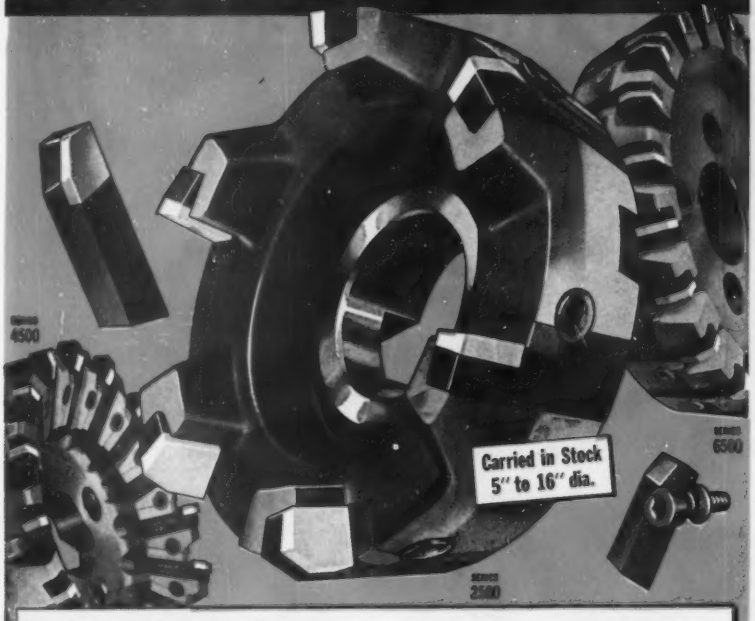
The Gairing
STANDARD MILLING CUTTERS

E-CON-O-MILL



YOU'LL SAVE

ON INVENTORY • *Same size blades, for cutting steel, cast iron or non-ferrous, fit cutter bodies of all sizes in all series.*

ON GRINDING • *Blades are supplied sharpened, ready for use, may be re-sharpened in or out of the body, to a gage.*

WAITING for DELIVERY • *All series 2500 cutters 5" to 16" dia. and all blades carried in stock for immediate delivery.*

Whether you buy one or several sizes, you always save with E-Con-O-Mill. Proved savings in the cost of diamond wheels alone have caused many shops, both large and small, to standardize on E-Con-O-Mill • But, foremost, they're efficient cutters of truly one-piece rigidity • Get the whole story on this great development in standard tooling by writing for our E-Con-O-Mill catalog.

The GAIRING Tool Company

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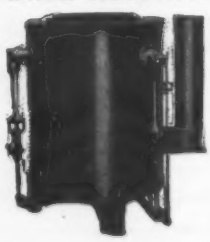
BUZZER *Gas* **FURNACES**

NO BLOWER or POWER NECESSARY



UP TO 1650° F. QUICKLY ATTAINABLE

Just connect to your gas supply and this BUZZER Atmospheric Pot Furnace is ready for operation. An innovation in design they are unbeatable for salt bath or lead hardening. Even heat, close control, high efficiency are only few of the many features. Available in many sizes.

Send today for the BUZZER catalog.

CHARLES A. HONES, INC.
121 South Grand Avenue, Baldwin, L. I., N. Y.

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shearing and pressing machines?

reach for Machine Tool Catalogs

"... a great time-saver"

These manufacturers' catalogs are instantly available in Section 6 of your Machine Tool Catalogs:

Joseph Behr & Sons, Inc.	L & J Press Corp.
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General Mfg. Co.	Struthers-Wells Corp.
Innocenti	Thomas Machine Mfg. Co.
Johnson Machine & Press Corp.	Verson Allsteel Press Company
	Wales-Strippit Corp.

***ALSO:* The following catalogs, in other sections of your Machine Tool Catalogs, contain information on shearing and pressing machinery:**

Armstrong-Blum Mfg. Co.	Greenlee Bros. & Co.
Bryant Chucking Grinder Co.	Hall Planetary Co.
Cincinnati Milling Machine Co.	Landis Tool Co.
Colonial Broach Co.	Norton Co.
Consolidated Machine Tool Corp.	Snyder Tool & Engineering Co.
Gisholt Machine Co.	Sundstrand Machine Tool Co.
	Taft-Peirce Mfg. Co.

In other sections of the File you will find additional catalogs containing useful information on a wide range of machine tools and accessories.

Sweet's Catalog Service

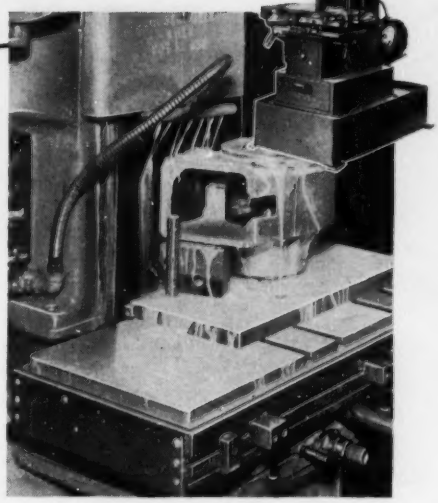
Division of
F. W. Dodge Corporation
119 West 40th Street, New York 18, N. Y.

PORTER-CABLE

ABRASIVE-BELT MACHINES

(Now Made and Sold by Engelberg)

Do More Surfacing Jobs FASTER and BETTER



Features high speed cutting by millions of abrasive points imbedded in a continuous belt, cooled and cleaned by water and other coolants. Does close tolerance work on flats, squaring, cylindrical surfacing; deburrs, knocks off corners, forms radii, bevels and other operations. Often does milling, shaping, grinding operations 10 times faster — saves 75-90% set-up time.

PLATEN OR FREE BELT

Model B-6W. Quickly adaptable to flat, curved or irregular pieces. Various shaped platens form the flexible abrasive belt to fit many shapes of work. Free belt reaches inaccessible spots.

CONTOUR GRINDER

Model C-6. For curved or flat-face grinding or polishing. Flexible abrasive belt runs over shaped contact roll. Loaded abrasive wheel no longer necessary. Wide-range adjustments easy for varied work. Saves set-up time and reworking of piece.

FINAL FINISH

Model WG-4. For production runs on small parts, fed freehand or by simplest fixtures. Gives final finish to jobs done on automatics, hand and hacksaws, lathes, milling machines, etc. Grinds carbide tipped tools.

BG8/FT9 Grinds Casting 100% Faster; No Distortion

Problem: Machine two rim surfaces of aluminum oil burner casting with single set-up.
Solution: Model BG8/FT9 with indexing fixture. Both sides are ground without moving the piece. Net grinding time for two surfaces: 15 seconds. This was 100% faster than former milling time. In spite of rapid stock removal there was no distortion.

• FREE SAMPLE GRINDING

We will prove Abrasive-Belt Machining can cut your costs. Send samples for recommendations and actual test grinding. No obligation.

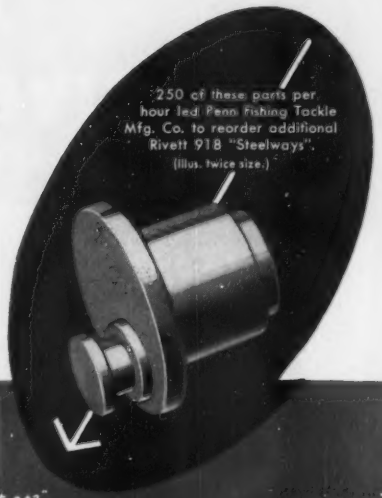
ENGELBERG

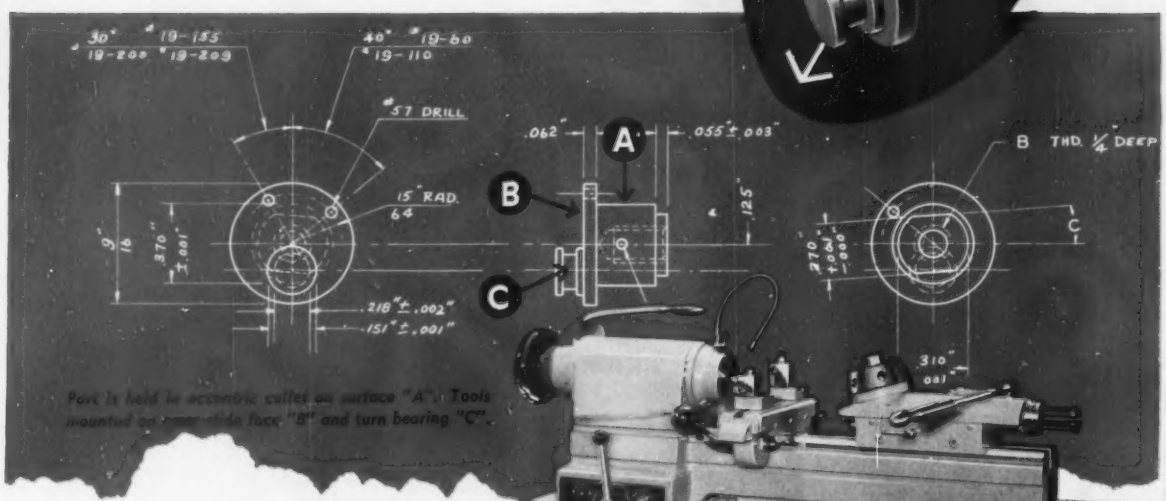
The ENGELBERG Huller Co., Inc.
184 Seneca St., Syracuse, N. Y.

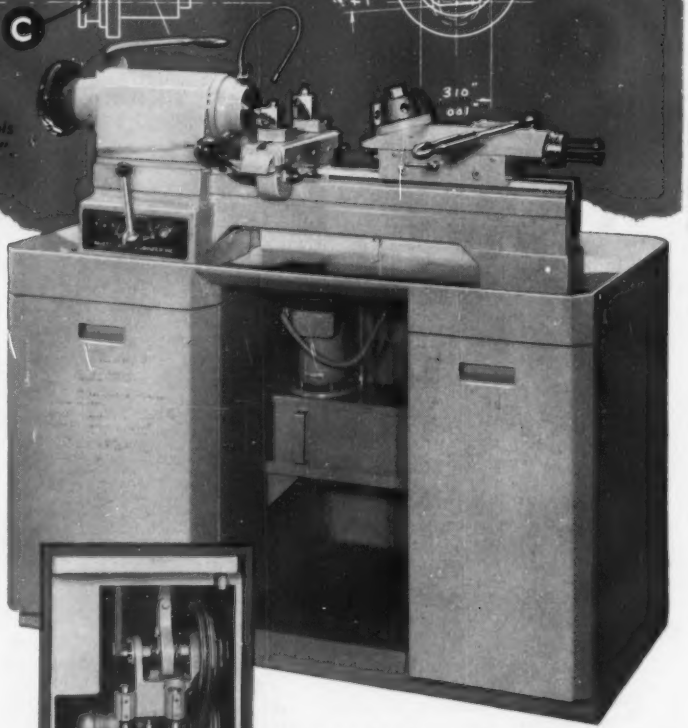
Send case history booklet and name of nearest distributor.

Name.....
Title.....
Company.....
Address.....
City..... State.....

INSTANT start-stop boosts Penn Fishing Tackle parts to 250 per hour!







Penn Fishing Tackle Mfg. Co. practices what it preaches. Its officials went fishing recently —to catch some ideas for stepping up production on several eccentric parts. Investigation of the Rivett 918 "Steelway" Cabinet Turret Lathe revealed that machine with its production drive was ideally suited to their requirements.

This production drive features "split-second" starting and stopping of the lathe spindle by movement of the lever chuck closer handle. With one forward pull, the operator closes the collet on the work, releases the brake and engages the spindle drive. When the lever is pushed back, the spindle drive is disengaged, the brake mechanism is applied and the work is released.

Installation of the 918 "Steelway" turret proved immediately successful. Production of troublesome parts was boosted two-fold. A 918 "Steelway" can boost your production, too! Why not go fishing and see what savings can be caught!

Model 918 "Steelway" Cabinet Turret Lathe.

← *Insert shows production drive.*
Motor runs continuously regardless of number of times spindle is started and stopped, thus eliminating overheating of motor.

RIVETT

RIVETT LATHE & GRINDER, INC., DEPT. AMR 3 BRIGHTON 35, BOSTON, MASS.

ARROW·HART

ARROW AH HART

Electronic VARIABLE SPEED DRIVE

. . . the "BRAIN" that brings "AUTOMATION" to this new

ROY SCREW SLOTTER

One Machine does all this

- HANDLES ALL TYPES OF WOOD, SHEET METAL and MACHINE SCREWS
- SLOTS ALL HEAD SHAPES in ALL MATERIALS
- HANDLES ALL SCREW BLANKS from NO. 2 to NO. 12 and from ¼" to 1½" LONG
- ADJUSTS FROM 125 TO 720 PIECES PER MINUTE

BOTH THE WORK CARRIER WHEEL AND THE SAW HAVE FOUR SEPARATE SPEEDS THAT CAN BE INSTANTLY ADJUSTED INDEPENDENTLY OF EACH OTHER

THANKS TO ARROW-HART VARIABLE SPEED DRIVE!

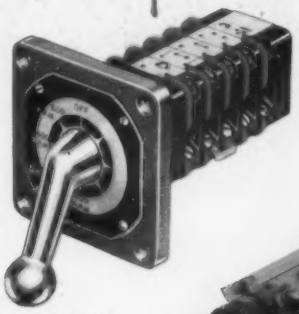
TURN THE PAGE FOR ADDITIONAL INFORMATION

Here's another important step in Machine Tool "AUTOMATION"

MADE POSSIBLE BY THE

ARROW AH HART

Electronic PACKAGED DRIVE WITH "PPS" SWITCH CONTROL



Thanks to Arrow-Hart Controls, this new screw slotter has achieved a degree of automaticity and adaptability that far surpasses that of any previous machine of this type. It is equipment like this that will be the basis of tomorrow's "automatic factories."

The two Arrow-Hart Electronic Variable Speed Controls used in the slotter are Packaged Drives; each consists of: an operator's station (the A-H "PPS" Switch), the A-H Variable Control Unit, and the series motor. This Package provides an unparalleled control, flexibility and versatility at low cost.

For any fractional horsepower variable speed application, an Arrow-Hart Drive offers many important advantages including: low cost; a wide, stepless range of speeds (up to 100 to 1 if required); speeds held substantially constant with varying loads; dynamic braking; instant reversing; and all plug-in replaceable parts for easy maintenance. Use of the series motor provides higher breakaway torque at any speed setting plus faster acceleration.

Especially where multiple operations or settings are required, the "PPS" Switch adds greatly to economy, versatility and efficiency. Acting in place of push buttons, relays and contactors, it provides safer, more convenient single point control. The operator can move from any position on the dial to any other position without activating any of the intervening circuits. Up to 16 positions are available from one compact control station.

This high-output screw slotter handles a wide variety of screw sizes, types and materials. Operation, including de-burring, is completely automatized. Screw blanks are simply placed in the hopper on the top; finished work is discharged into the work basket at the front. The machine is manufactured by the Gros-ite Manufacturing Company, Inc., Hartford, Conn., and is sold exclusively by Ray Machinery and Sales, Inc., also of Hartford.

Send Now FOR COMPLETE Control INFORMATION

AH

Industrial Control Division
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 Hawthorn Street, Hartford 6, Conn.

Please send me complete information about the Arrow-Hart

☐ Electronic Packaged Drive ☐ "PPS" Switch ☐ "RA" Motor Controls
☐ Push Button Controls ☐ Air Conditioning Controls

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INDUSTRIAL CONTROL DIVISION

THE ARROW-HART & HEGEMAN ELECTRIC COMPANY

HARTFORD 6, CONN., U.S.A.

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Sales Engineers in Columbus, O., Fayetteville, New York, Manchester, Ct., Seattle, Springfield, Mass., York, Pa.

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Printed in U.S.A.

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc. 738 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

ACHIEVING PERMANENCE OF ACCURACY

Just as important as the initial accuracy of a precision machine tool is the *life expectancy* of this accuracy. And the most effective way to insure long-lasting accuracy is to give *dimensional stability* and *wear resistance* special consideration during machine design.

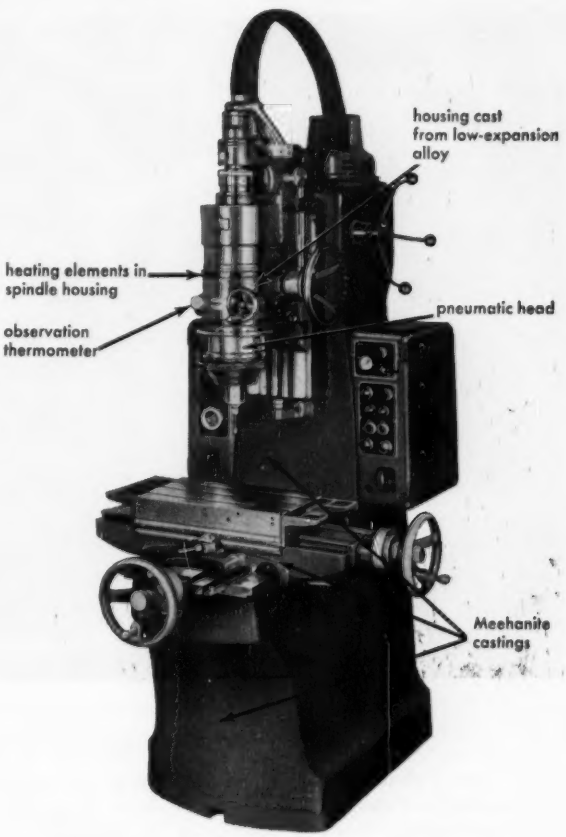
The following causes of dimensional *in*stability are most frequently encountered: thermal expansion, unstable constituents in the material; and stresses in the material. In the design of the No. 2 Moore Jig Grinder, all of these factors were taken into account and special features were incorporated to counteract them.

All the inherent accuracy of a measuring system, capable of positioning the workpiece in relation to the spindle within a tenth, is rendered nearly valueless if the spindle does not retain its position during machining operations. Such movement, caused by thermal expansion, is inevitable unless steps are taken during design to minimize or prevent it.

Electric heating elements were incorporated in the main spindle housing of the Moore Jig Grinder to maintain uniform temperature—whether machine is running or not. An observation thermometer is located so as to indicate any abnormal temperature change within the housing. The housing itself is cast from 36% nickel iron to further minimize effects of temperature variations. And a pneumatic head directs air onto the workpiece, preventing undue temperature rise both in the workpiece and in the locating members of the machine.

Instability resulting from gradual relaxation of locked-in stresses in castings is prevented by suitable stress-relieving cycles during the manufacture of Moore machine components. Similarly, the best way to avoid unstable hardened steel parts is by tempering them. Moore follows this practice.

Further wear resistance was built into the Moore Jig Grinder by means of: adequate way and bearing surface, scientifically proportioned to minimize and distribute wear; all reciprocating parts of nitrided steel—almost as wear-resistant as carbide; pressure lubrication of ways; lead screws and nuts made from nitrided steel and aluminum bronze, respectively, combining to offer low coefficient of friction, abrasion resistance and hardness; and dust protection devices.



Special design features of the No. 2 Moore Jig Grinder insure permanence of accuracy.

ACHIEVING GREATER ACCURACY QUICKLY is the job of Moore Jig Grinders and Moore Jig Borers. Both make possible accurate lead screw settings within .0001". This team will produce precision holes, contours and surfaces *in your shop* at minimum cost. For detailed catalogs, write to: Moore Special Tool Company, Inc., 738 Union Avenue, Bridgeport 7, Conn.

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You Get Many Benefits by Specifying VICKERS Hydraulics

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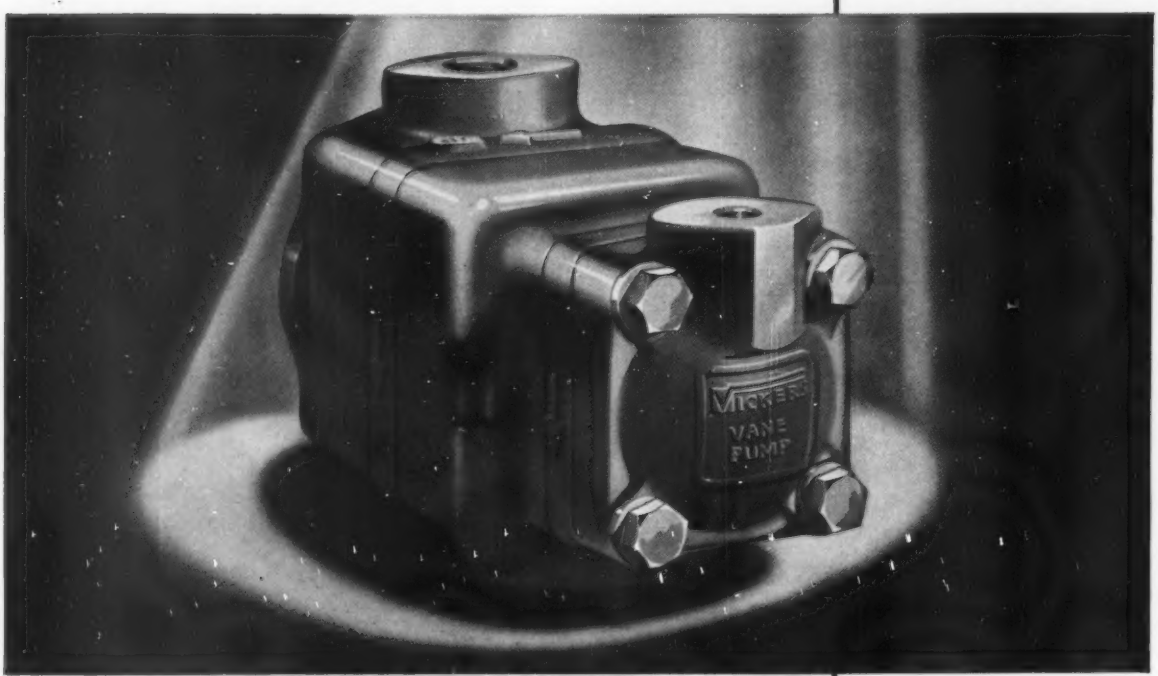

Certain names and designations have become synonymous with long-established quality in consumer products. Some that you will recognize are Sterling, Sheffield, Wedgwood, etc. Similarly, certain names signify long-established quality in industrial products . . . you can think of many with little difficulty.

Among the latter is VICKERS, . . . for long-established quality in Hydraulics. For more than a quarter century, the mark VICKERS, has signified superior products and services . . . with continuous pioneering in hydraulics research and development. As a result, the list of leading manufacturers who use Vickers Hydraulics continues to grow. You also can get the benefits of this dependable, long-established quality by specifying Vickers Oil Hydraulic Equipment.

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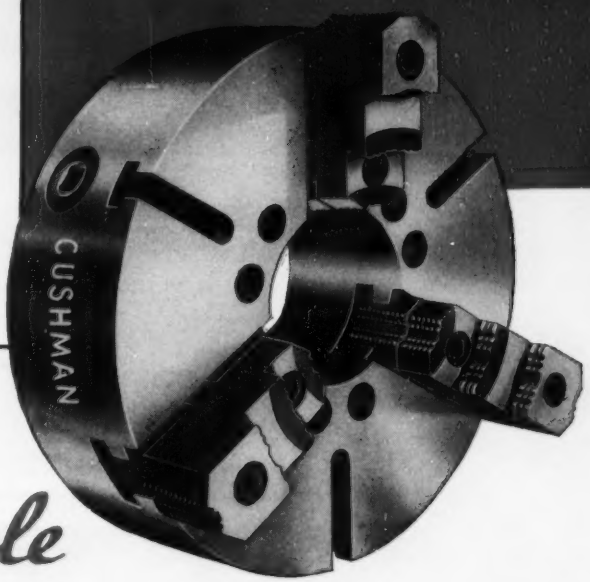

Remember:

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an example

. . . of this is Cushman's 3-Jaw Heavy Duty Self-Centering Chuck for use on turret and automatic lathes. This chuck is but one of many types of manually operated chucks designed and built by Cushman to serve the metal-working industry with long life and continued accuracy. True heavy-duty construction with ample sections, correct weight distribution and precision balance makes these chucks a first choice with heavy-duty machine tool builders. These chucks are given a thorough inspection to meet present-day high standards of precision.

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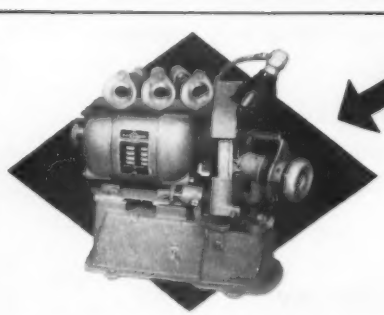

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The *Black Diamond Drill Grinder* is the only drill grinder so fast and easy to operate. Used regularly by thousands! Enables anyone to grind small drills to absolute accuracy.

- **Exclusive "positive positioning" assures precision grinding.**
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QUICK ADJUSTMENT AND POSITIVE ACTION make the **MAX-WELL-MADE** Model JF recessing tools especially suitable for use in today's high-speed production schedules.

This tool operates on any jig and fixture set-up to cut snap ring grooves, "O" ring grooves and oil labyrinths as well as for inaccessible spot facing, external necking, precision undercutting, etc.

Accurate to within ±0.001-inch, Model JF is available in five sizes to pilot into standard bushings from 1" to 2¼ inches.

JF tools can be supplied with either standard Morse or adjustable adapter, quick-change, straight or special shanks.

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888-MC

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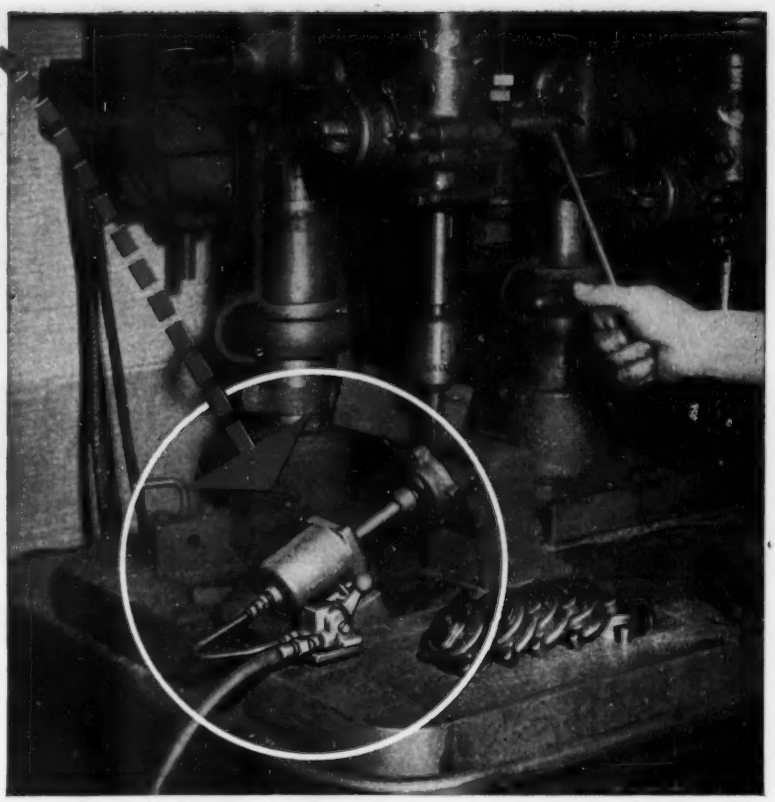

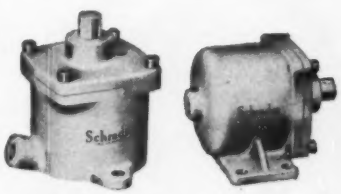

Base Mounted **Leg Mounted**

CLAMPAIR CYLINDERS

Schrader ClampAir Cylinders are available either base or leg mounted, in 1", 2¼" and 3" diameters delivering a 2" or 1" stroke. A wide selection of Schrader Valves is available, too, to operate ClampAirs.

Watch a worker making ready for a simple drilling operation. He places the work in a fixture and hand-clamps it. With everything all set to go, you'll find he takes as much as ten seconds just to grip the work tightly in the clamp.

Multiply that by thousands of machine operations. You'll find a substantial portion of work time is used up *before* actual production begins.

You can eliminate nearly all of this lost time with the new Schrader ClampAir Cylinder... with no more effort than opening a valve.

The ClampAir—actually a bantam air cylinder—has plenty of power to hold work firmly—with the same force every time. *No more rejects from uneven holding forces!*

ClampAir will serve you well on drill presses . . . milling machines . . . gluing operations—and scores of other places all over the shop. In all of these, production can be boosted with ClampAir. And remember—since ClampAir is basically a push-type air cylinder, you can use it any time you need a short, hard stroke.

It's easy to find out how ClampAir can increase production and worker efficiency. Write, outlining the applications in which you are interested—or fill out the coupon below.

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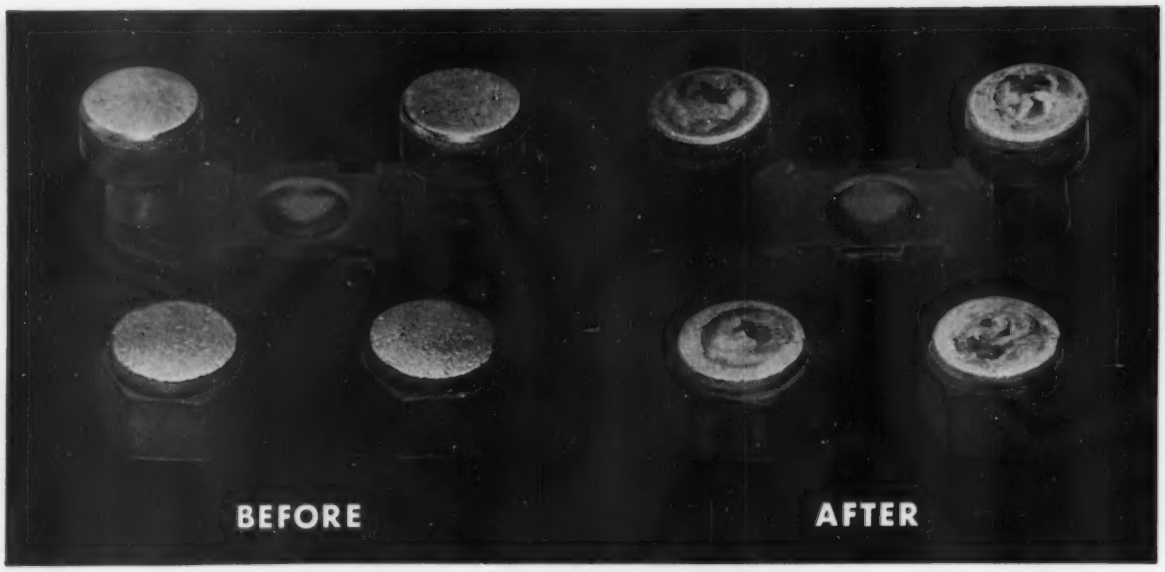


PROOF OF LOW MAINTENANCE ON CLARK TYPE "CY" STARTERS

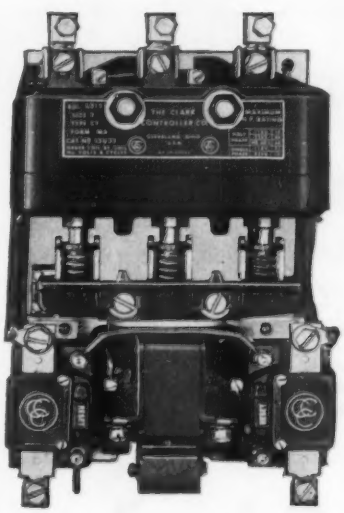
These unretouched photos show contact tips from a CLARK Bulletin 7707 contactor—the contactor used in the standard Bulletin 6013 size 2 AC Motor Starter — as they looked before and after a year of hard use.

The contactor is in service at Cleveland Hone and Manufacturing Company, on a special transformer and rectifier circuit used in processing automotive parts. The tips shown right above were removed from the contactor after 12 months of steady service, often operating as frequently as 5000 times per hour.

Note that slight discoloration and minute pitting are the only evidence of wear. They require no cleaning, dressing or filing, and are in condition to give many more years of dependable service.

The secret of long contact life in the CLARK Type "CY" Starter is its exclusive arc-quenching principle, using strong multi-turn magnetic blowouts and double-break contacts. Forced rotation causes the arc to move continually on the contact surfaces, distributing the heat and preventing pitting or "build-up" at any one point. Result: extremely effective arc interruption, and greatly reduced wear on tips.

Write for descriptive literature.



CLARK Type "CY" Starters include many more features for dependable service and reduced maintenance. Let us tell you the complete story.

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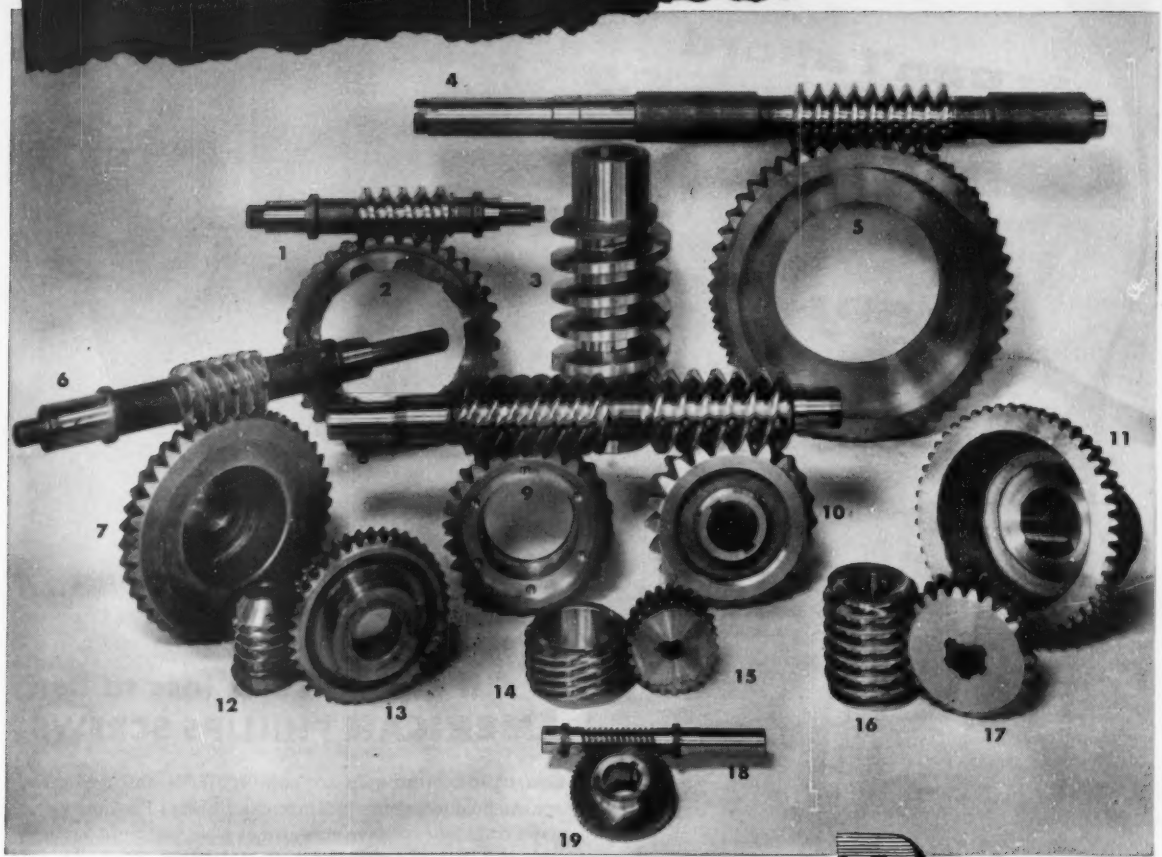

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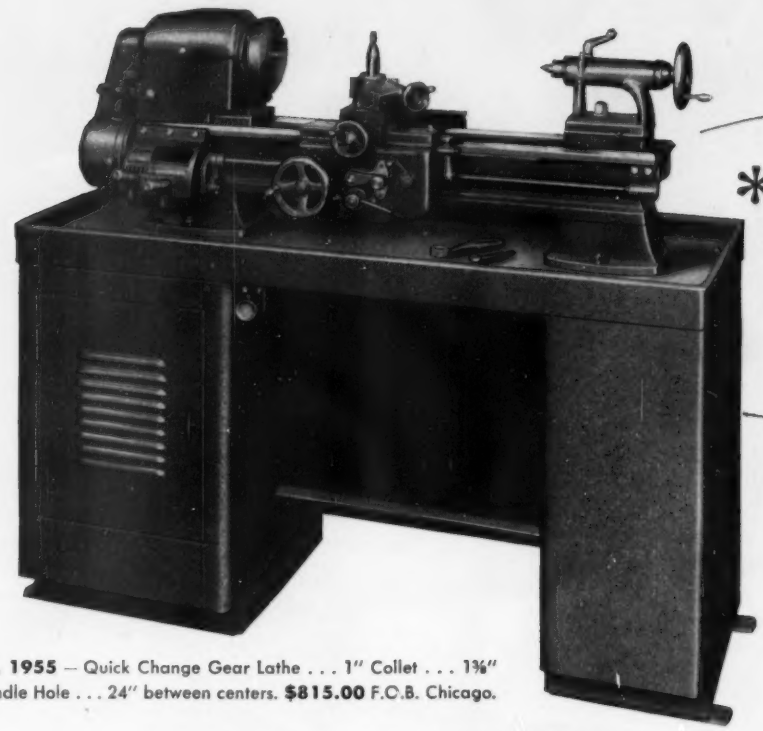
The Answer

To your metal turning cost problem may well be this 11" Logan Lathe *



*One of the many in the complete Logan Line of 9", 10", 11" and 12" swing Lathes, and 8" Shapers.

No. 1955 — Quick Change Gear Lathe . . . 1" Collet . . . 1⅜" Spindle Hole . . . 24" between centers. **$815.00** F.O.B. Chicago.

The cost of precision results drops sharply when you turn work on this 11" swing Logan "1955". You will be surprised, too, at how much of your work this compact lathe can handle. With 1" collet capacity, 1⅜" bore, and 24" centers it takes a lot of pressure off costly-to-run, big lathes . . . with no difference in precision results.

Sustained accuracy and low cost performance are built into this modern Logan Lathe. The spindle revolves on preloaded *ball* bearings of extreme precision that need no adjustment for any speed in the full range of 45 to 1500 rpm. The rugged, balanced special alloy bed has two V-ways and two flat ways precision ground. The automatic apron, double-walled and friction-free, with spline-driven power cross feed, has a convenient, lever-operated, disc type clutch. The modern V-belt drive transmits maximum power to the headstock. You will find the 1955 equally effective in production, shop and toolroom. Ask your Logan Lathe dealer for full facts.

Brief Facts

Collet Capacity, 1"

Spindle Hole, 1⅜"

Swing over bed, 11⅛"

Center Distance, 24"

Bed Width, 6 15/16"

Ball Bearing Spindle

16 Spindle Speeds, 45 to 1500 rpm

Double V-belt Drive for extra power to spindle is completely enclosed

Threads—48 selections, RH or LH—4 to 224 per inch

Write for the Logan Lathe Catalog

Logan ENGINEERING CO.

Lawrence and Lamon Avenues, Chicago 30, Illinois

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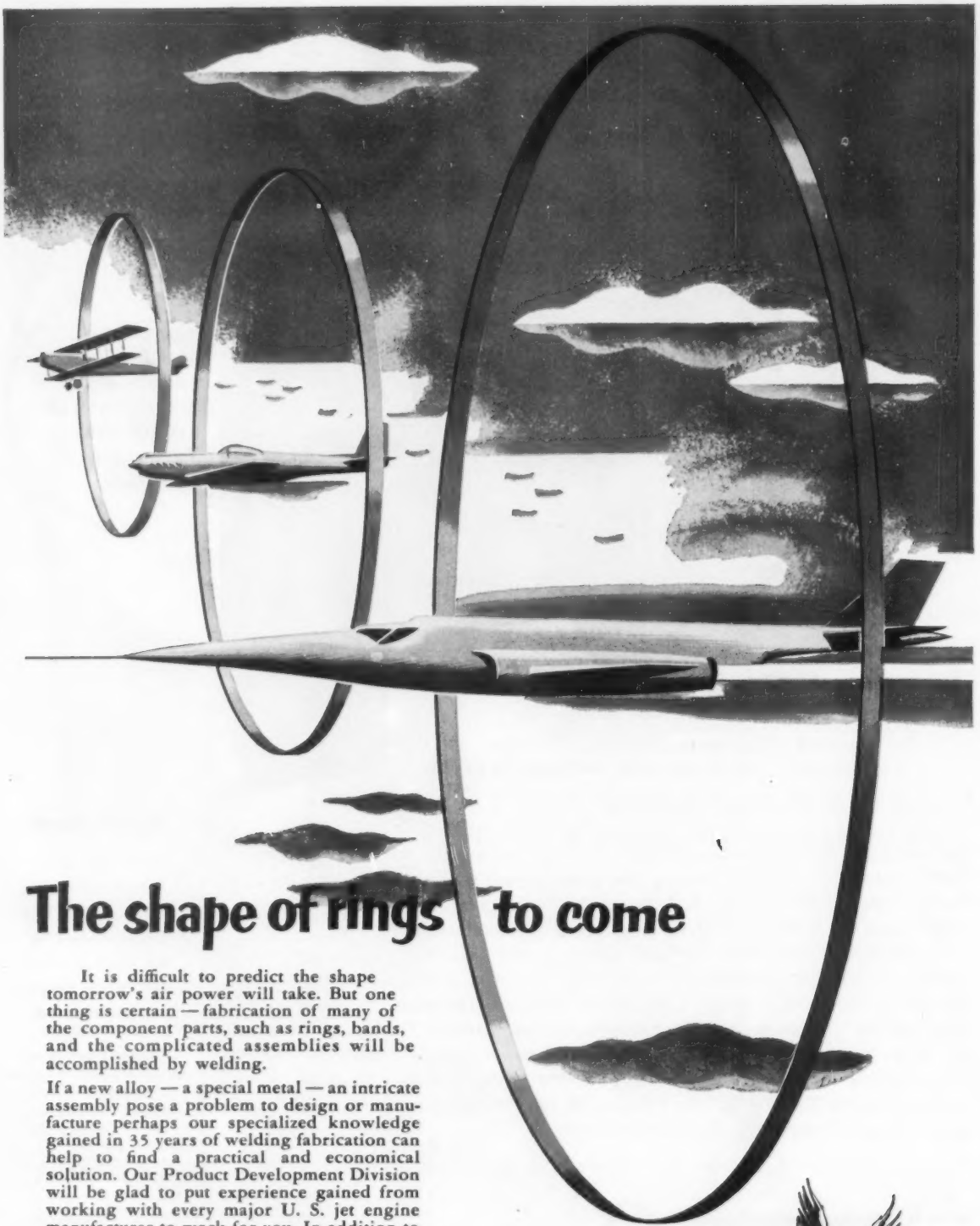

The shape of rings to come

It is difficult to predict the shape tomorrow's air power will take. But one thing is certain — fabrication of many of the component parts, such as rings, bands, and the complicated assemblies will be accomplished by welding.

If a new alloy — a special metal — an intricate assembly pose a problem to design or manufacture perhaps our specialized knowledge gained in 35 years of welding fabrication can help to find a practical and economical solution. Our Product Development Division will be glad to put experience gained from working with every major U. S. jet engine manufacturer to work for you. In addition to fusion and resistance welding of ferrous and non-ferrous metals, American Welding can provide designing, engineering, metallurgical and machining facilities.

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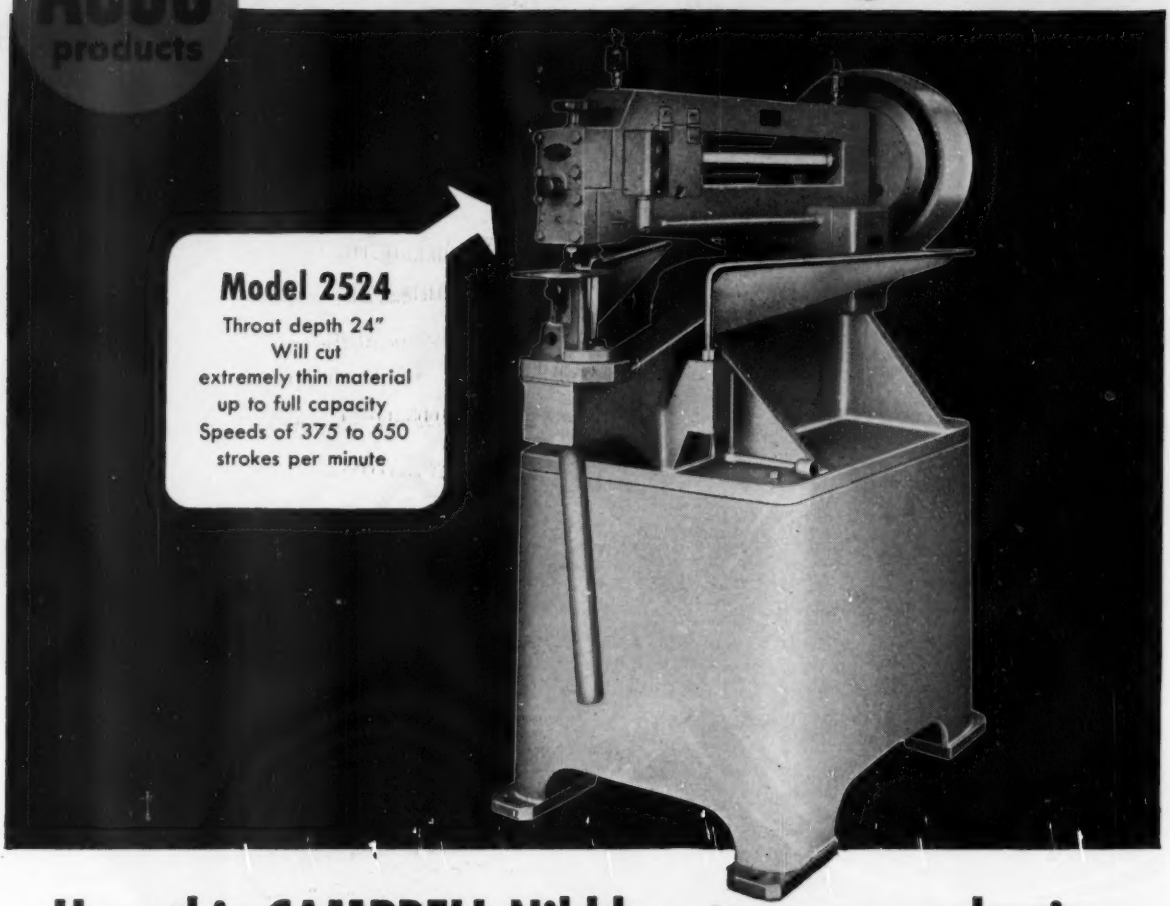
ACCO products

CAMPBELL Nibbling Machines



Model 2524

Throat depth 24"
Will cut
extremely thin material
up to full capacity
Speeds of 375 to 650
strokes per minute

How this CAMPBELL Nibbler steps up production

• Operator feeds sheets or plates into this CAMPBELL Nibbling Machine with both hands. No adjustment of any part of the machine is necessary to change the direction of the cut. A template, clamped above the work, guides the punch accurately to any shape or design. Machine is equipped with V-belt drive completely enclosed.

MODEL 2524 cuts low carbon steel and other soft materials up to ¼" thickness—corrosion resisting steel up to 3/16" thickness. The variable stroke is easily changed with a wrench. The nibbled part is comparatively smooth and requires only a little finishing for an absolutely smooth edge.

The machine is of exceptionally heavy construction, one piece, with C-shaped steel frame, heavily ribbed to insure maximum rigidity. It is strong enough to cut ¼" soft metal without springing the head or injuring the punch and die. It will do all nibbling operations within its capacity without distorting the metal, without setting up strains or starting invisible fractures.

CAMPBELL *makes a complete line of Nibblers and Abrasive Cutters. One of them could save money for you. Write for literature. Tell us your job and let us assist in the selection of the* CAMPBELL *nibbler or abrasive cutter best suited to it. Write for catalog.*

ACCO

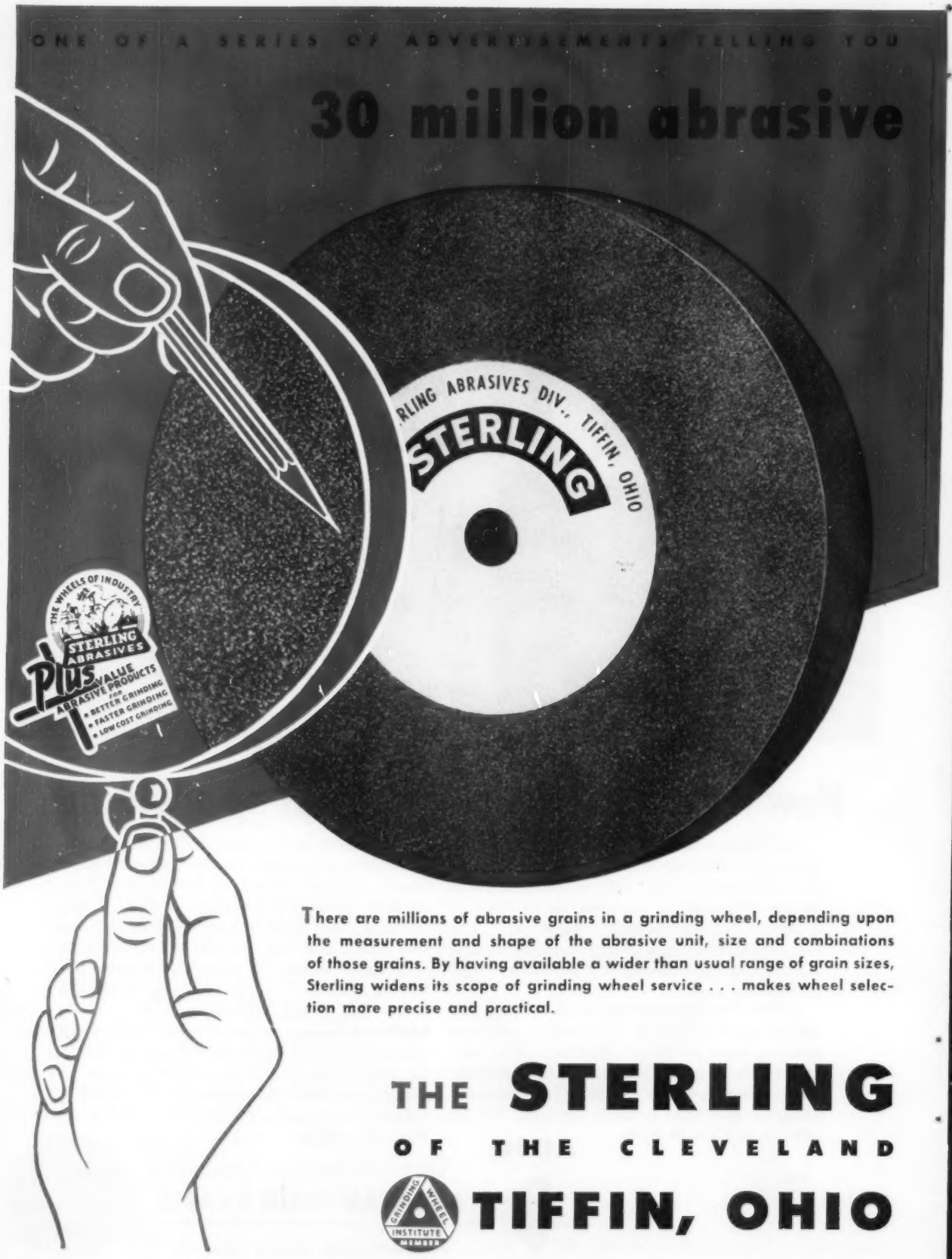
Campbell Machine Division
AMERICAN CHAIN & CABLE

923 Connecticut Avenue, Bridgeport 2, Connecticut

Wet and Dry Cutters and Nibblers

ONE OF A SERIES OF ADVERTISEMENTS TELLING YOU

30 million abrasive



There are millions of abrasive grains in a grinding wheel, depending upon the measurement and shape of the abrasive unit, size and combinations of those grains. By having available a wider than usual range of grain sizes, Sterling widens its scope of grinding wheel service . . . makes wheel selection more precise and practical.

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GRINDING WHEEL INSTITUTE MEMBER

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WHY YOU SHOULD USE STERLING GRINDING WHEELS

grains Can't be wrong!

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Strength Check

Density Check

Those millions of abrasive grains in a Sterling Grinding Wheel cannot be wrong. They must be right . . . of the correct proportion, size, and analysis to produce desired results *every time*. To make this possible, Sterling technicians create *just for you* a tailor-made grinding wheel. They combine proper portions of selected abrasive grains with special bonds to originate the wheel you need for that unusual or ordinary job.

Sterling laboratory men test and check, retest and recheck so they may know, even before it is manufactured, the grinding wheel you should use. Results prove the superiority of this idea for turning out work faster, and creating cooler, more economical grinding for your troublesome job.

Put Sterling to the test. A Sterling engineer will gladly check your entire grinding setup and produce, at no obligation or cost whatever, a "Wheel of Industry" specification you'll order again and again. May we serve you *now*?

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For those interested in quick, authoritative information on all types of grinding, these folders are most important. Write us and your file will be sent immediately.

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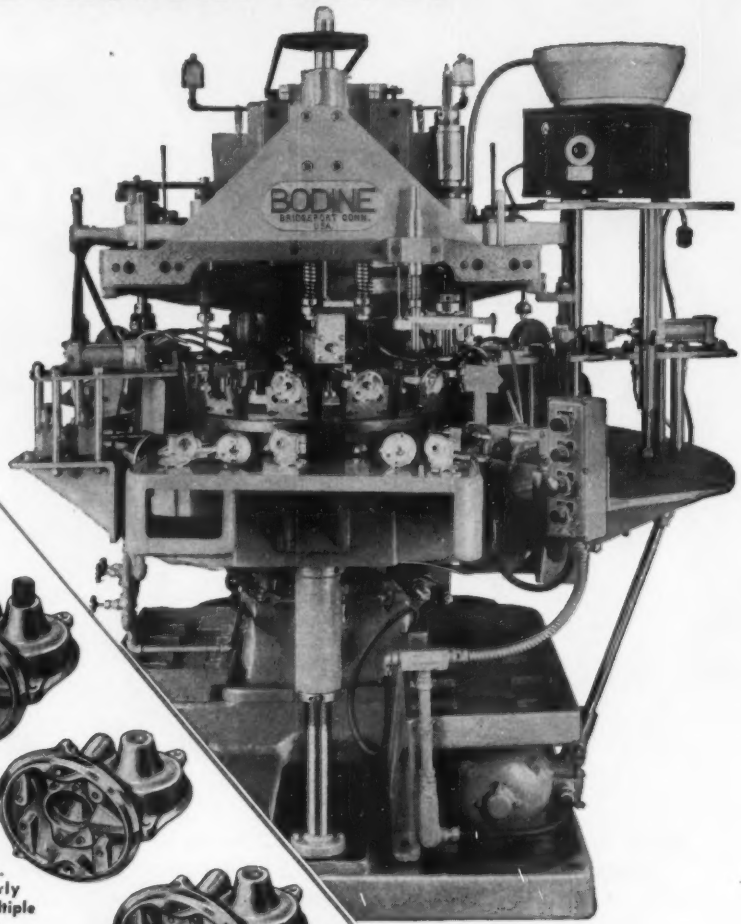
DISTRIBUTORS IN ALL PRINCIPAL CITIES

Bodine CASE HISTORY NO. 37



1 [illegible]

2 [illegible]

3 [illegible]

4 Automatically clamp.

5
Spot face ⅛" dia. maintaining depth to ± .002".

6
Automatically hopper feed, transfer and insert Oilite bushing.

PROCESSING WINDSHIELD WIPER MOTOR HOUSINGS

7
Drill 4 - #31 dia. (.120") holes and 1 - .1235" dia. hole (angularly mounted multiple drill head).

8
Tap 2 holes #10-32 with angularly mounted 2-spindle tap head.

9
Size I.D. of Oilite bushing to .3735" - .3745" dia.

10 [illegible]

[illegible]

PRODUCTION

One piece per stroke . . . 20 strokes per min. — 1000 pieces per 50-min. hour. 10,000 individual operations per 50-min. hour.

MATERIAL

S.A.E. #925 Die Casting (Parts No. EMG-2, EMG-3, right- and left-hand).

TOLERANCES

(Other than specified above) Drilled holes: Size .001". Location: ± .002". Tapped holes: Class 2 threads.

MACHINE

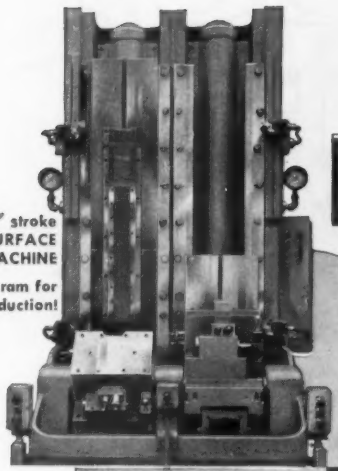
Bodine Model 42-30 Drilling, Tapping, Assembling Machine. Write us for Bodine Brochure AM-3, "12 Case Histories."

"You Can't Meet Tomorrow's Competition With Yesterday's Machine Tools."

THE
Bodine
CORPORATION
BRIDGEPORT CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

1BD54



10 ton, 42" stroke
DRV SURFACE
BROACHING MACHINE

Double ram for
fast production!

with this

RUGGED

LAPOINTE

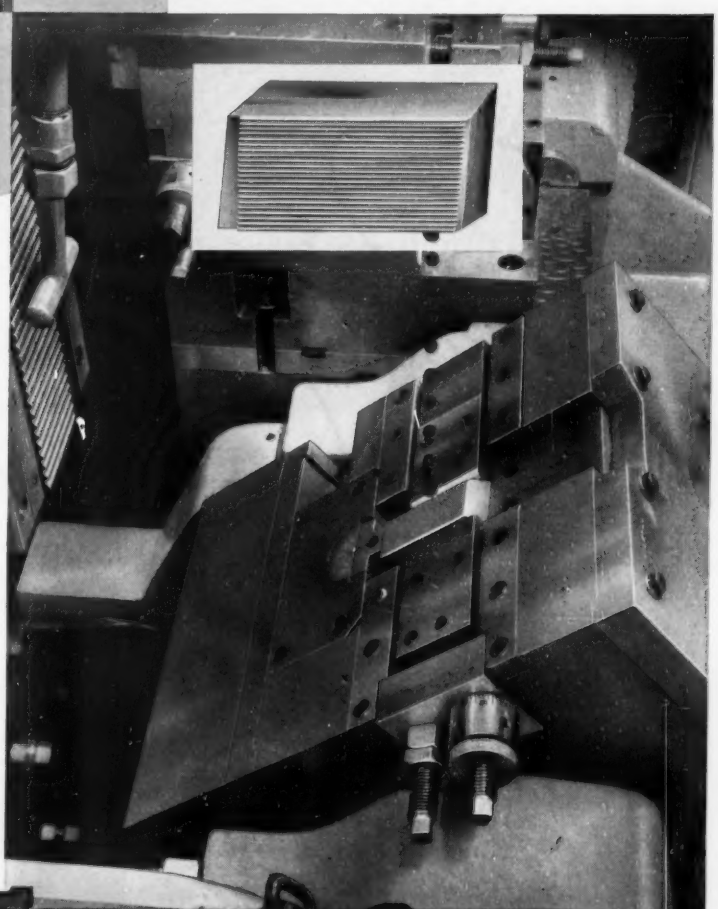
BROACHING MACHINE

and this

RIGID

TIP-DOWN* FIXTURE

Send for Bulletin DRV-2



you can

BROACH

400

high speed steel

MILLING CUTTER INSERTS

per hour!

...and here's the exciting news; 25 different sizes broached with minimum interchange of adapter blocks.

Exclusive LAPOINTE TIP-DOWN MASTER FIXTURE for safe and convenient handling of parts.

Parts are automatically clamped hydraulically, but manually released for reloading.

*Exclusive with LAPOINTE

THE LAPOINTE MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

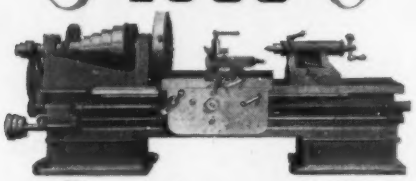
In England: Watford, Hertfordshire

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

5305

IN

1895

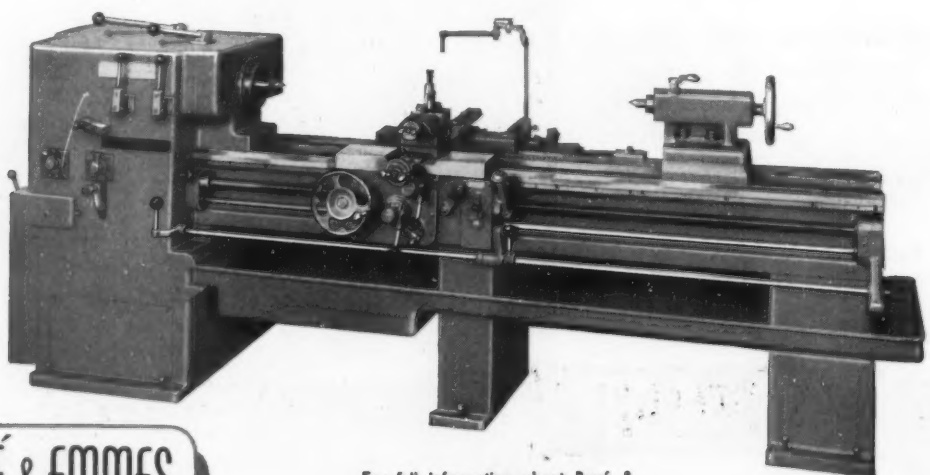


BOYÉ & EMMES
LONG LIFE
ENGINE LATHES
looked like this!

...In that year the Boyé & Emmes design featured a single back gear, which doubled the number of spindle speeds previously considered adequate.

Today **BOYÉ & EMMES LONG LIFE ENGINE LATHES**

incorporate the accumulated know-how of fifty-nine consecutive years of exclusive engine lathe manufacture.



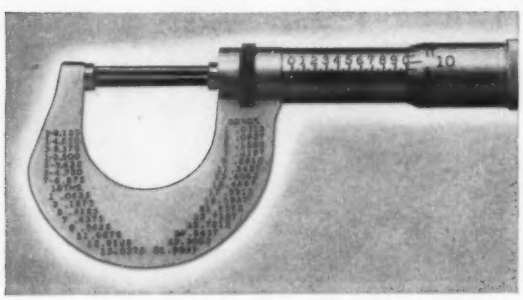
BOYÉ & EMMES
MACHINE TOOL COMPANY
125 CALDWELL DRIVE
CINCINNATI 16, OHIO
MACHINE TOOL CENTER of the WORLD

For full information about Boyé & Emmes extended range of spindle speeds and other modern design changes write for FREE Bulletin 5305. Ask also for our new folder "Fifty-Nine Years of Engine Lathe Evolution."

*consistent quality

is as important in the pin as in the gear

To function effectively, a spring pin must drive easily into holes drilled to normal production tolerances, compressing as driven. To drive easily, hold firmly and fit flush, the pin —*every* pin—must meet the strict requirements of specifications such as those prepared by the SAE and the Military Services.



Since failure of a pin can be as costly as a failure of any other precision part, it is important to check the pins *you* buy for uniformity . . . uniformity of diameter and length, shear strength, hardness, insertion and removal forces, and recovery of diameter.

Rollpin has been tested many times—by many manufacturers—with a consistently high performance record. It has been widely recognized as the "quality" fastener of its type. In this case, quality can be—and should be—measured. We strongly urge that you test for quality when buying spring pins.

ELASTIC STOP NUT CORPORATION OF AMERICA

Dept. R28-39, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

☐ Rollpin samples
☐ Rollpin bulletin
☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

OHIO

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Stock or Special

• For Forty years Ohio Gear engineers and craftsmen have enjoyed an unusual reputation for turning specifications into power transmission of highest industrial quality.

Ohio gears are produced by the most modern equipment and methods in gear cutting. Complete up-to-date machinery operates throughout the plant... cutting, broaching, milling, drilling, heat treating and grinding.

Ohio Gear specializes in Spur, Bevel, Miter, Helical, Worms and Worm Gears, Sprockets, and Spline Shafts.

We will be glad to assist you in your gear production problems and quote on your specifications.

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THE OHIO GEAR COMPANY
1326 East 179th St. • Cleveland 10, Ohio

OHIO GEARS

FOR YOUR *Evaluation*

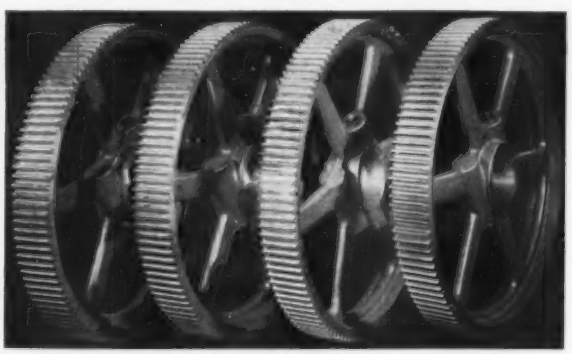
AGMA INTERPRETATION OF YOUR GEAR DATA GRAPHICALLY PRESENTED

To avoid possible inaccurate interpretation of the quality gear you require we enclose, with our quotation, a chart detailing the tolerances to which we will manufacture your gear.

We base our price on the class of gear depicted on the chart. Our interpretation is based on AGMA Standards for fine-pitch gears.

6717

Dexter MACHINE PRODUCTS, INC.
CHELSEA, MICHIGAN, Box 328
Phones: Detroit WE 3-1694—Chelsea 2-1791



Cast Iron CLAMP HUB GEARS

Each of these cast iron clamp hub gears for paper mill use weighs 1300 pounds—accurately machined to give long, trouble-free service. Stahl has the experience, skill and production facilities to more than satisfy your most exacting gear needs—any size, any quantity, any material. Send for Stahl's estimate first!

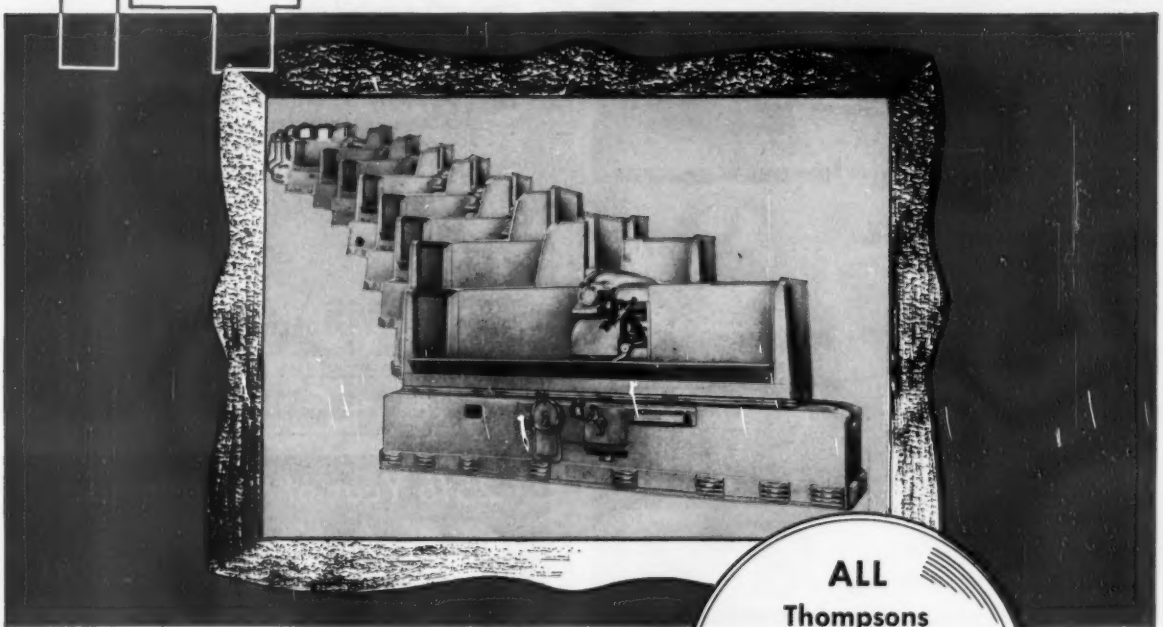
SPURS TO 72" PD, 1 DP
BEVELS TO 54" PD, 1 DP
SPIRAL, HELICAL and WORM GEARS TO 48" PD, 2 DP
CONTINUOUS-TOOTH HERRINGBONE TO 60" PD, 2 DP
SPROCKETS TO 72" PD, 2½" CP
RACKS TO 20 FT. LONG, 3 DP
SILENT GEARS; RAWHIDE, BAKELITE, FIBROIL
HEAT-TREATED, CASE OR FLAME HARDENED GEARS — OF CARBON OR ALLOY STEEL

Stahl
GEAR & MACHINE COMPANY
3901 Hamilton Ave. Cleveland 14, Ohio

LOOK CLOSELY AT THIS PICTURE
OF GRINDER PRODUCTION AND SEE WHY...

14 *is a lucky number*

for a manufacturer requiring precision grinding



After twelve years continuous manufacture of precision ground products, ten Thompson Surface Grinders proved so efficient and economical that this manufacturer ordered four more machines.

Thompson Grinders are available in a wide range of types and sizes from 6" x 18" to 72" x 384" to meet all production, special or tool room grinding requirements. The Thompson line includes machines from giant Hydrial Way Grinders to automatic Truform Jet Blade Contour Grinders, Dual Rotary Grinders and Broach Grinders.

ALL Thompsons operate 1 continuously with much LESS DOWNTIME

thats why

it will pay you to invest in

Thompson Grinders

CONTACT THOMPSON TODAY FOR HELP WITH YOUR MACHINING PROBLEMS

THE THOMPSON GRINDER COMPANY
Springfield, Ohio

GRANT

SPECIAL GEARS

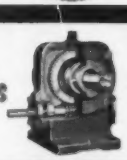
Made to Your Specification

When it's a "Special", with tough specifications, send the job to Grant and you can relax.

The gears will be cut exactly to your specifications and delivered on time to meet your production schedules.

Grant's complete facilities, coupled with more than 75 years of gear "know-how", are your assurance of dependable gears for all requirements.

Specify Grant Speed Reducers



they're quality-built for longer, trouble-free operation. Seven types, each available in several ratios, there is a model to fit your reduction needs. A wide range of types available from stock for prompt delivery!

Whether it's gears, sprockets or speed reducers, you'll find what you need in the new Grant Catalog — just issued.

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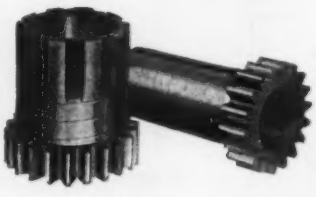

Each gear order we receive, no matter what the specifications or quantity, gets our very closest attention. Each step of gear manufacture is carefully controlled to assure lasting service and satisfaction. THE ADAMS COMPANY, 1905 Bridge Street, Dubuque, Iowa.

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BEVEL AND	(Spur and Helical)	GEARS
MITER GEARS	RATCHETS	(Spur and Helical)
WORMS AND	SPLINED SHAFTS	GROUND THREAD
WORM GEARS	LEAD AND FEED	WORMS
SPROCKETS	SCREWS	RACKS

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Dubuque, Iowa, U. S. A.

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FINE GEARS MADE TO YOUR SPECIFICATIONS

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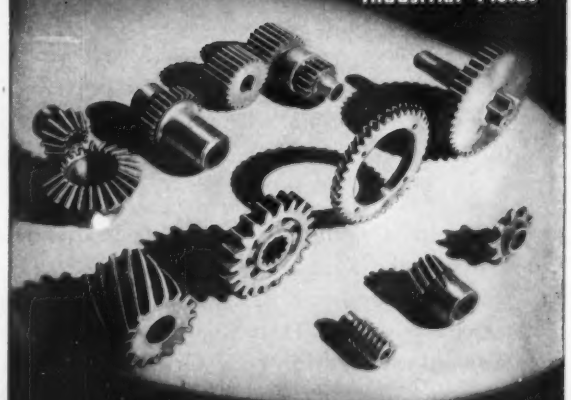
for Aircraft *and* Industrial Fields



A complete plant equipped with over one hundred major machine tools for gear production.

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the NEW L.A. *Line*

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is your BEST

electric motor BUY

A smaller, better power package to meet new NEMA standards

with NEW MODERN STYLING

plus

Improved ventilation
New conduit-box arrangement
New bearing construction
More compact design and better protection
More versatile mounting

Here you have complete use of modern motor materials, design techniques and new manufacturing methods. You also get more power in a smaller package — and clean, streamlined motor styling to add modern appearance to the equipment these new motors drive.

This new styling is completely functional. Ventilating grilles, for example, blend into the general motor design — yet they provide better protection, greater safety, admit more cooling air.

Completely enclosed housing provides protection for the new L.A. line in any mounting position — floor, sidewall, or ceiling.

Standardize now on the new L.A. line for both your product and your plant — and get the most modern motor construction available. See your nearby Louis Allis Sales Engineer today for the complete story.

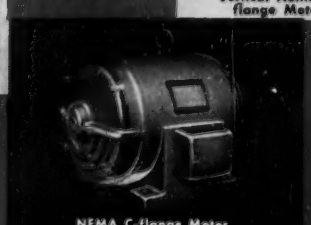
THE LOUIS ALLIS CO.

Milwaukee 7, Wisconsin

LA-102

Vertical NEMA C-flange Motor

NEMA D-flange Motor



NEMA C-flange Motor

We specialize in SPECIAL MOTORS— *and* PROMPT DELIVERY, TOO

There's a Louis Allis special motor for your toughest application. Whatever electrical or mechanical modifications you need, check first with Louis Allis.

Put the Bite on Simonds!

...to cut your costs with the right type saw!

✱ INSERTED TOOTH SAW

For heavy production cutting of steel, brass, copper and aluminum. Alternating square and beveled teeth "tri-vide" chips for easy cutting and clearance. Maximum saw clearance gives cooler, freer cutting . . . permits extremely high rate of feed. High Speed Steel Teeth can be easily replaced singly or in complete sets, in your own plant.

✱ SEGMENTAL SAW

For especially smooth cuts on production work. Extra-service High Speed Steel toothed segments are securely held in a tough alloy plate by a tongue and groove design, have quick clearance for faster, freer cutting. Teeth are alternately square and beveled for easy cutting and clearance of "tri-vided" chips. Can be sharpened on any automatic grinder.

✱ SOLID TOOTH SAW

For general shop cut-off jobs . . . for use on smaller automatic cut-off machines, and for cutting jobs where narrow kerf is important. Clearance ground and furnished in High Speed, Si-Maloy (Pat.), or Semi-High Speed Steel. Simonds own steel, plus accurate heat treating and grinding give these saws longer life, more dependable performance.

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CIRCULAR Metal Cutting SAWS

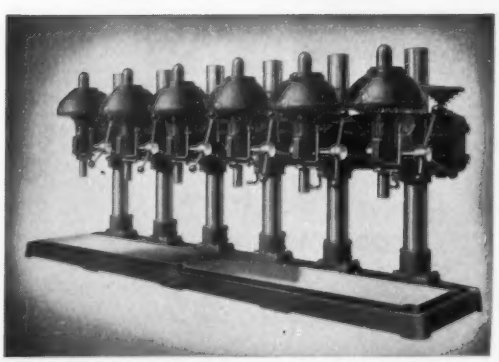
STAMINA FOR BONUS YEARS OF PRODUCTIVITY

"Buffalo" No. 18 Floor type Drill with foot feed. Operator has both hands free.

. . . YOURS IN THE SHOP-PROVEN "BUFFALO" NO. 18 DRILL

Its heavy-duty, precision-machined spindle runs smooth and true on ball bearings . . . free of end play . . . designed and built to stand the endless punishment of high-production work. Its feed controls are intelligently placed for minimum fatigue during long runs. Setup adjustments are easily and speedily made by convenient cranks. And you can get this workhorse drill in a choice of 12 models, in 1 to 6-spindle bench or pedestal units to suit your exact requirements. Drilling capacity, up to 1" in cast iron.

Here is a machine that is bound to hike your output, improve accuracy and reduce repairs and obsolescence to the bone. Think of the profits it could be making for your shop . . . right now! Why not write for Bulletin 3123 and investigate it further?



"Buffalo" No. 18 Drills are available in as many as 6 spindles for operation with several setups on a production line.

BUFFALO FORGE COMPANY

509 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

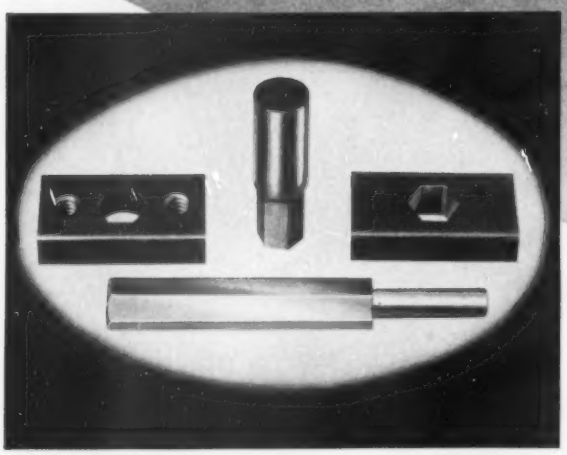
DRILLING • PUNCHING

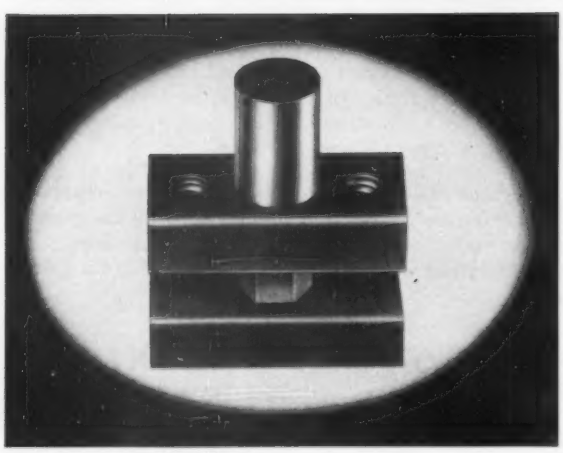
SHEARING • BENDING

Can You Make This Punch, Die and Stripper Plate Out of Tungsten Carbide for

$35.50*

In Your Plant





Electrode manufacturing time	2 hours
Cutting time on die	½ hour
Cutting time on stripper	½ hour
Cutting time on punch	½ hour
Accumulated setup time	1 hour
TOTAL LABOR TIME:	4½ Hours
Cost of Tungsten Carbide material:	$22.00

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BOOTH 1342—ASTE TOOL SHOW

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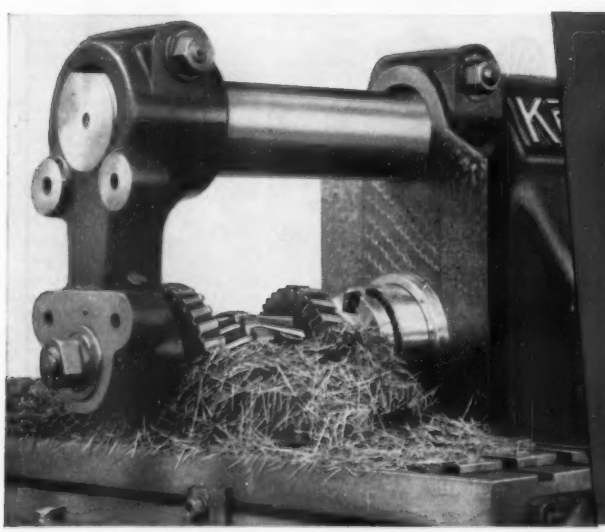
DO YOUR MILLING MACHINES POSE SERIOUS '54 DOLLAR-QUESTIONS?

Are your milling machines **OLDER THAN YOU THINK?** Are they costing you **more than you can afford?** • Recent surveys indicate many thousands of millers over 10 years old . . . and some even younger . . . have been so badly overworked that they are much older than their age implies. In terms of production efficiency, it would pay to "retire" them. Precision-wise and cost-wise, many "good looking" machines are dangerously **too old** to compete in today's production economy. • Are **your** milling machines wastrels? Are they squandering dollars? Are they an "iron curtain" between you and profitable sales in today's competition? Wouldn't you consider abler replacements, as a sensible investment, to increase your ability to produce at a profit?

• *You'll find* sound answers to these 1954 dollar-questions in our BULLETIN* on the new

IMPROVED TYPE "G" KEMPSMITH MILLING MACHINES

. . . free from cost-adding non-essentials . . . fortified with practical performance advantages . . . economical in first cost and maintenance . . . RIGHT for toolroom, maintenance, job shop and general precision production operations.



☆ *Write today* for the NEW IMPROVED KEMPSMITH Type "G" Milling Machine BULLETIN No. 134 . . . or contact your nearest KEMPSMITH DISTRIBUTOR.

THE KEMPSMITH MACHINE CO.

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Get production off to a profitable start! Use Columbus Die-Tool engineered tools. Jigs, Fixtures, and Special Machinery individually designed and built to produce your product alone . . . at a rate to match your production schedule. That's production economy! That's the wisdom of CDT special machinery! That's how Columbus Die-Tool can put your production on a profitable basis. Columbus Die-Tool are specialists in building special tools, jigs, fixtures and machinery . . . have been for over 46 years. Talk over your special problems with us. Absolutely no obligation. Write today.

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Manufacturers of
JIGS • FIXTURES • BUILDING MACHINE TOOLS COMPLETE
SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

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GIANT KEYSEATERS

M & M Giant Keyseaters, built in a wide range of sizes, speedily and accurately cut internal keyways or splines in the bores of pulleys, gears, fly wheels or any other machine part. Special fixtures and cutters are available for unusual shaped keyways and taper work. Send us your problems today.

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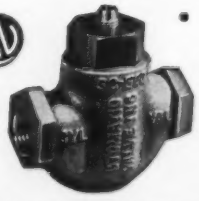
104 Holden Street • SAGINAW, MICHIGAN

Solenoid VALVES

PILOT VALVES
3-WAY 4-WAY
For operating
Master Valves and
Small Cylinders



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Controls speed of
Air and
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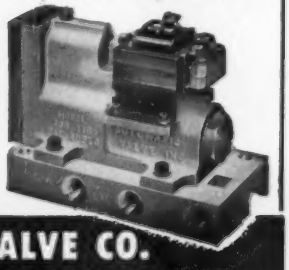
3-Way and 4-Way VALVES
Pilot Operated
Sizes ¼" — ⅜"
½" and ¾"
Write for Bulletin



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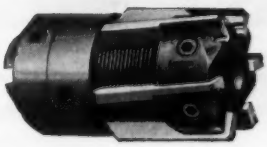
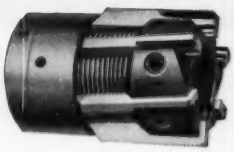
Chucking and Shell Designs

Sizes from 15/16" to 6" in Diameter





with CARBIDE TIPPED, Cast Alloy or High Speed Steel Blades

Standardize on McCrosky Super® Adjustable Reamers! They enable you to combine the efficiency of carbide reaming and the greater economy and longer life of inserted blade design. Our exclusive, patented, pin and screw locking device holds the blades as rigidly as a solid tool;— yet permits the blades to be released quickly; and adjusted evenly and accurately preparatory to regrinding. Consequently, only a minimum amount of the carbide is removed, saving grinding time, and minimizing purchases of replacement blades. The body lasts almost forever.

McCrosky Reamers have demonstrated their greater efficiency and economy under all kinds of work conditions. They cut freely without "chatter" . . . avoid any tendency to "dig in";— and meet every requirement of the higher operating feeds and speeds now being used in most shops.

Send for Bulletin No. R-17, and start today cutting your costs with McCrosky Super® Adjustable Cost Cutting Reamers.

McCROSKY *Universal* MILLING CUTTERS

Body can be bladed to rotate either right or left hand. Consequently, selecting blades with tips of proper material mounted at proper angles produces a cutter that meets any metal or machine condition. Write for Bulletin No. 531 today.

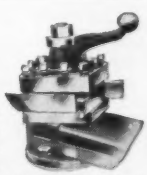
McCROSKY *Jack-Lock®* MILLING CUTTERS

Face Mills, Shank and Shell End Mills, Half Side and Staggered Tooth Milling Cutters fitted with high speed steel, cast alloy or carbide tipped blades. Sizes from 3" to 24" in diameter to meet any requirement. Write for Bulletin No. 17-M.

McCROSKY *Wizard®* QUICK-CHANGE CHUCKS

McCrosky's Wizard Quick-Change Chuck and Collet outfits hold tools centered and rigid. They enable the operator to change tools easily and quickly, without stopping or slowing down the spindle. Successive operation jobs become continuous. Write for Bulletin 18-C.

McCROSKY *Turret* TOOL POSTS



These tool posts permit successive tools to be swung into cutting position quickly, indexed accurately, and locked rigidly, giving engine lathes many of the advantages of turret lathes. Four styles—11 sizes. Write for Bulletin 18-T.

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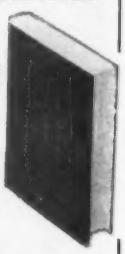

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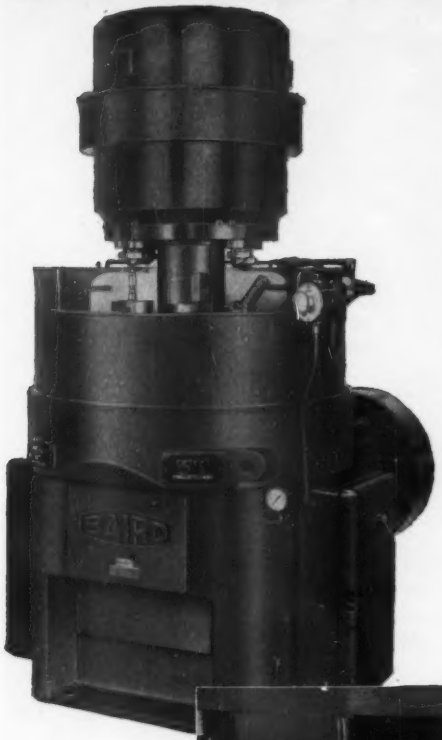
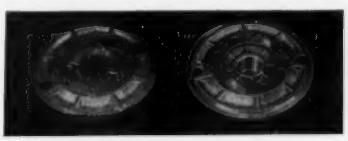


TOOLS MOVE HORIZONTALLY, OTHERS VERTICALLY, FOR FACING . . . TURNING

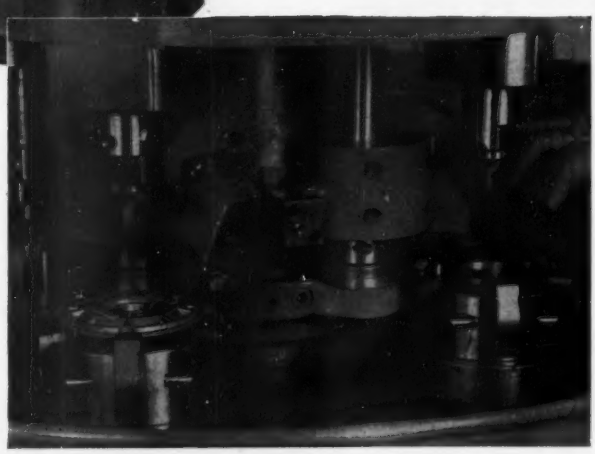
. . . and that's but one of the excellent features of Baird's No. 54VC (5" chuck, 4-spindle, vertical continuous lathe). As the turret revolves, eliminating unproductive indexing time, holding fixtures grip and release automatically for easy loading and unloading. Tools feed in and out of the cutting stroke.

This typical Baird tooling set-up bores the hole, faces and chamfers the hub, and turns the flange of a generator end plate. Cycle time 19.48 seconds, 5 seconds per piece, 720 per hour. Feed: boring hole and facing hub .0039" . . . turning flange .005" and .002" (forming tools). Cutting speeds: boring 348 ft.; turning 1985 ft. per minute.

Safety for operator and prevention of machine and product damage are mechanically and electrically controlled; tools cannot feed to work unless spindles are revolving; electrical equipment is enclosed, wiring concealed.



BEFORE AND AFTER



(Above) Front view, showing splash guards for wet cutting.

(Right) Tooling set-up for finishing a generator end plate.

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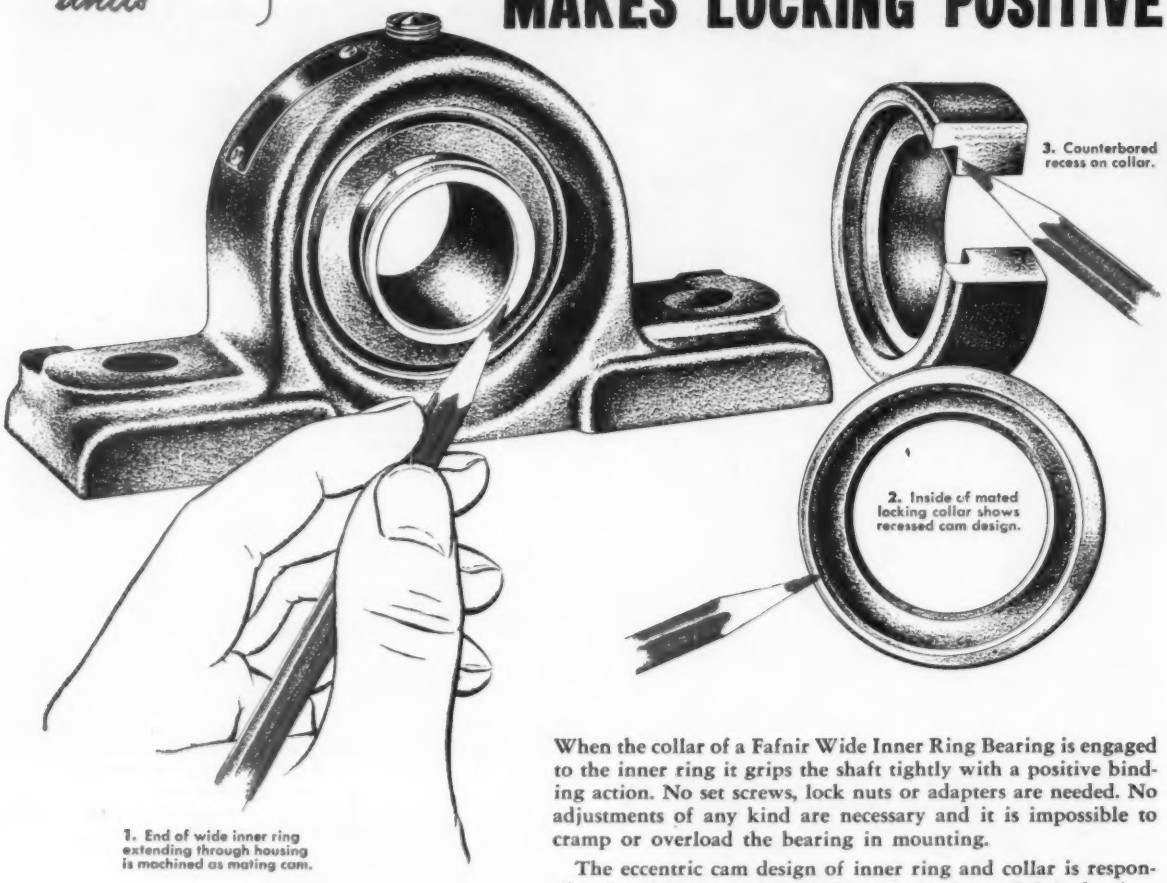
preference points on power transmission units

ECCENTRIC CAM DESIGN

of Inner ring and collar

MAKES LOCKING POSITIVE


3. Counterbored recess on collar.
2. Inside of mated locking collar shows recessed cam design.
1. End of wide inner ring extending through housing is machined as mating cam.

When the collar of a Fafnir Wide Inner Ring Bearing is engaged to the inner ring it grips the shaft tightly with a positive binding action. No set screws, lock nuts or adapters are needed. No adjustments of any kind are necessary and it is impossible to cramp or overload the bearing in mounting.

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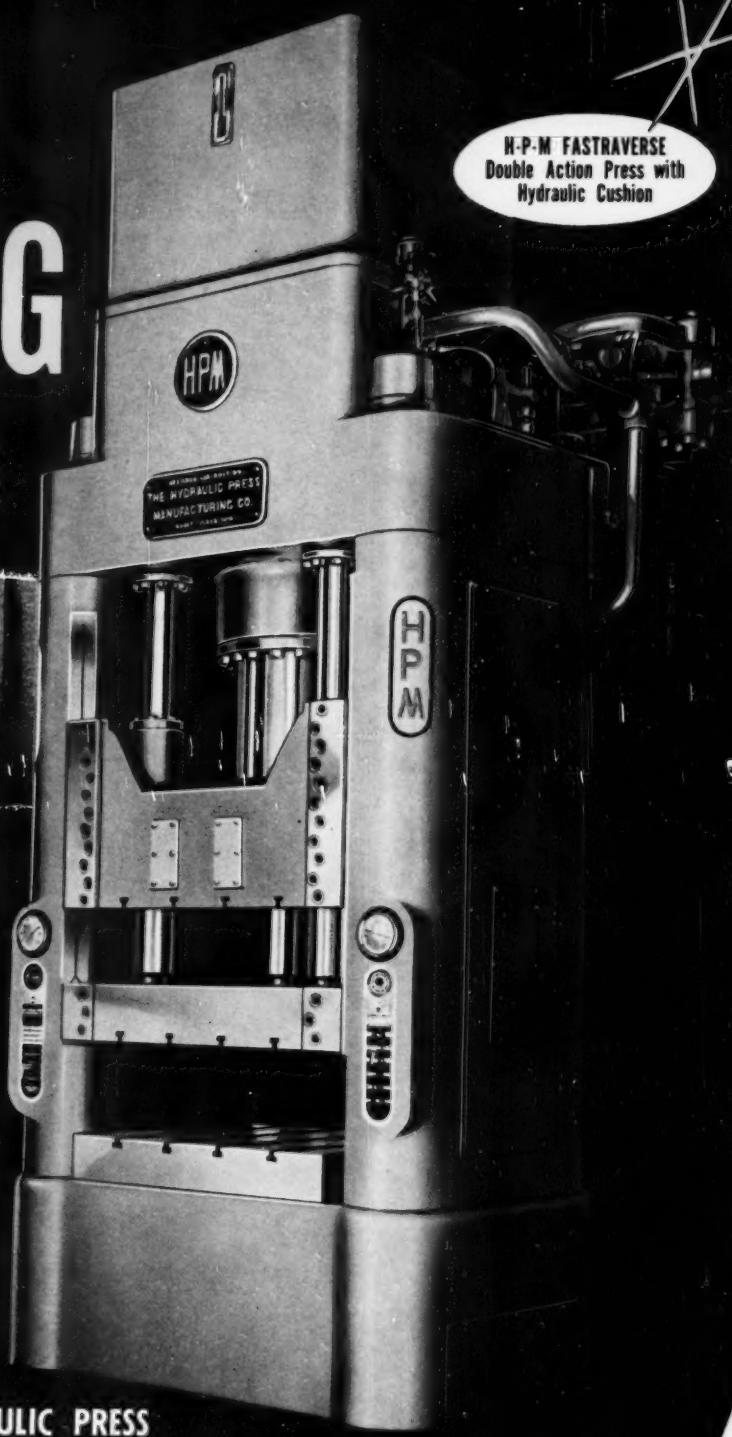

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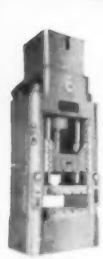
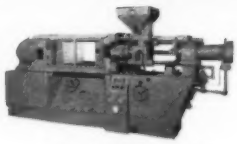
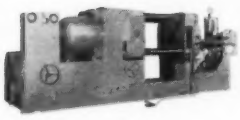
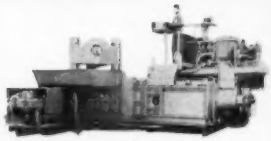

Metal Working

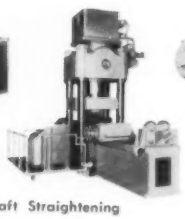
Blocking & Briquetting

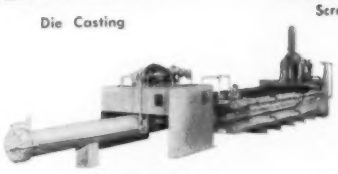

Injection Molding

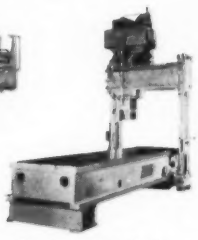

Die Casting

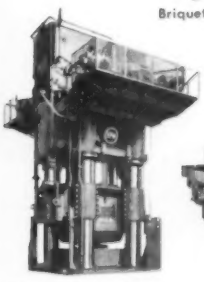

Scrap Baling

Compression & Transfer Molding


Shaft Straightening


Rayon Steeping


Two-way Straightening


Rubber Pad Forming

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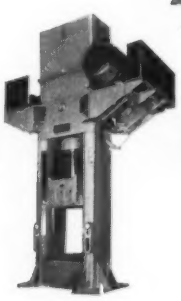
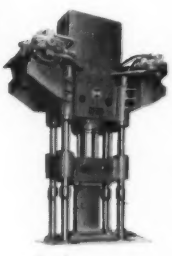
Cartridge Case

Cold Extrusion


Shell Forging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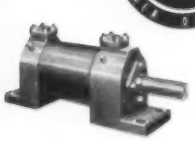

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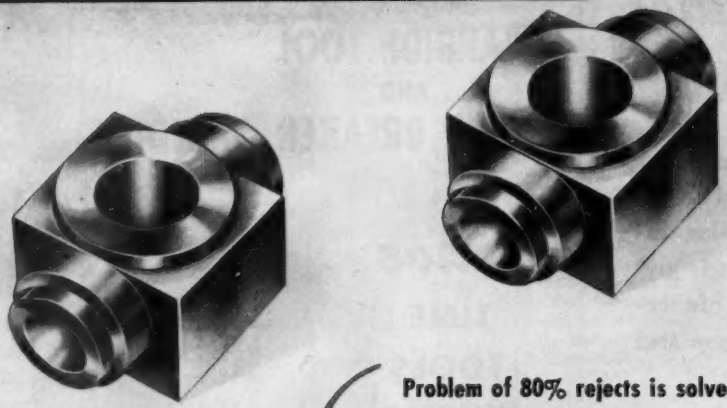

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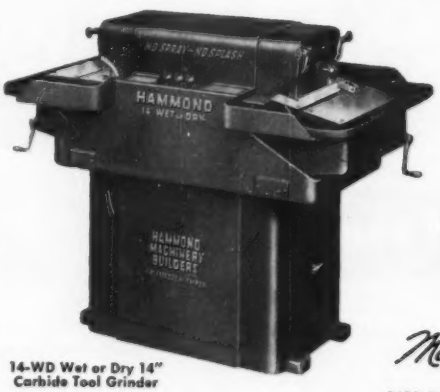

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#7		30-32-36-40-44-48-64
#8	32-36	30-40-56-60
#9		24-30-32-36-40
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5/16	18-24	12-14-16-20-22-27-29-30-32-36-40-44-48-56-72
3/8	16-24	9-12-14-18-20-26-27-28-32-36-40-46-48
7/16	14-20	12-16-24-27-28-30-32-40
1/2	13-20	10-11-12-14-16-18-24-27-28-30-32-36-40
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13/16		10-12-14-16-20-24-28-32
7/8	9-14	8-10-12-13-16-18-20-28-40
1	8-14	7-10-11-12-16-18-20-24-27-32
1 1/16		12-14-16-18-20-32
1 1/8	7-12	8-16-20-24-28-32
1 3/16		10-12-14-18-20
1 1/4	7-12	8-10-14-16-18-20-24
1 5/16		12-14-16-24-26-32-36-40
1 3/8	6-12	8-10-14-16-18-20
1 7/16		8-12-14-16-18-20-24
1 1/2	6-12	5-8-10-13-14-16
1 9/16		6-12-18-20-32
1 5/8		5 1/2-8-10-12-14-16-18-20-24-36
1 3/4		8-10-12-16-18
1 13/16		10-16-20-32-40
1 7/8		5-8-10-11-12-14
1 15/16		8-11-14-16-20
2		6-8-10-12-14-16-18-20
1/16		64-72
3/32		48-50-80
1/8		32-40-44-48
5/32		24-28-32-36-40-48
3/16		24-28-32-36-40
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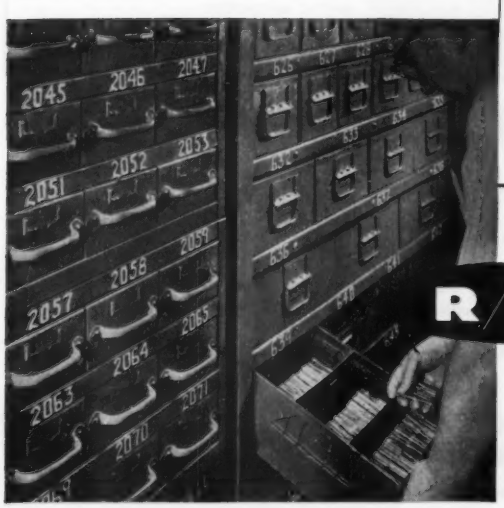

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LYKENS, PENNSYLVANIA
Specialists in tap manufacture
REPRESENTATIVES IN PRINCIPAL CITIES

LOBDELL UNITED COMPANY

Announces **the purchase of:**

BRIDGEPORT... Knife Grinders and Circular Knife Grinders

DIAMOND... Facing and Surface Grinders and Heavy Duty Pedestal Grinders

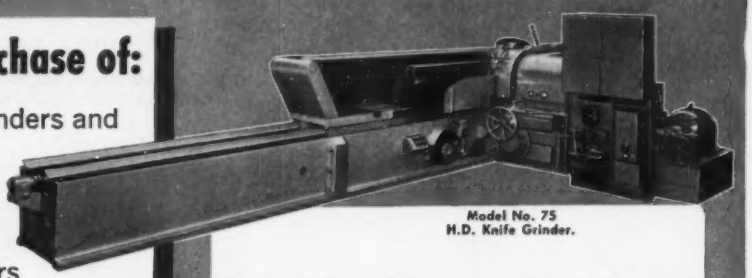
BRIDGEPORT... Abrasive Cut-Off Saws

... this equipment formerly produced by

BRIDGEPORT SAFETY EMERY WHEEL CO.

BRIDGEPORT DIAMOND MACHINE CO.

DIAMOND MACHINE CO.



Model No. 75
H.D. Knife Grinder.

Parts and service can be supplied for all machines now in use... new equipment will be quoted to suit your needs. Write us for further information.

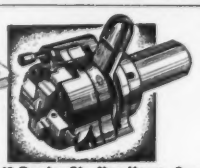
- Lobdell Paper Mill and Steel Mill Roll Grinders
- Bridgeport Knife and Facing Grinders
- Nazel Forging Hammers
- Dill Slotters
- Cold Cutting Friction Saws
- Abrasive Cut-off Saws

LOBDELL UNITED COMPANY

1836 WILMINGTON 99, DELAWARE 1954

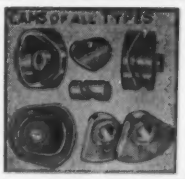
A SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY COMPANY

H&C Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

THE EASTERN MACHINE SCREW CORP., 20-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 334 N. San Pedro St., Los Angeles, Calif.* Canada: *F. F. Barber Machinery Co., Toronto, Can.*



INDEXING TURNTABLES

A SPECIALIZED CAM MILLING SERVICE, SPOT AND BUTT WELDING, TURNTABLES, POSITIONERS FOR BRAZING, SPRAYING, WELDING, SOLDERING OVER 100 TYPES CONTRACT PRODUCTION, SPECIAL AUTOMATIC MACHINES.

EISLER ENGINEERING CO., INC.
738 So. 13th St., Newark 3, N. J.

WALTHAM SUB-PRESSES...

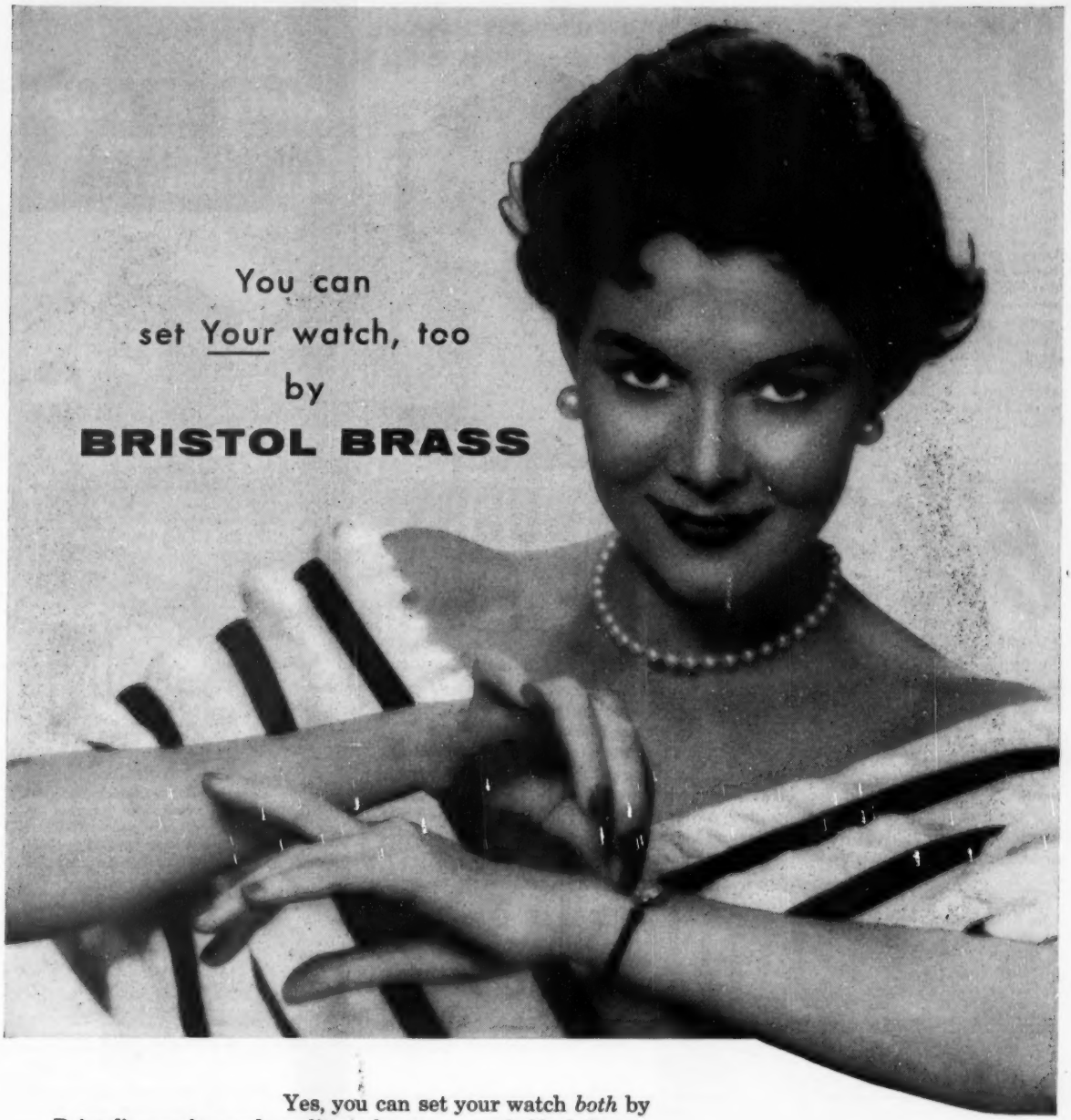
... for precision work

Arch Sub-Press

The cylindrical plungers in the Waltham Sub-Presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang

WALTHAM MACHINE WORKS
HIGH STREET, WALTHAM, MASS.



Yes, you can set your watch *both* by Bristol's service and quality, when you need *Clock Brass.*

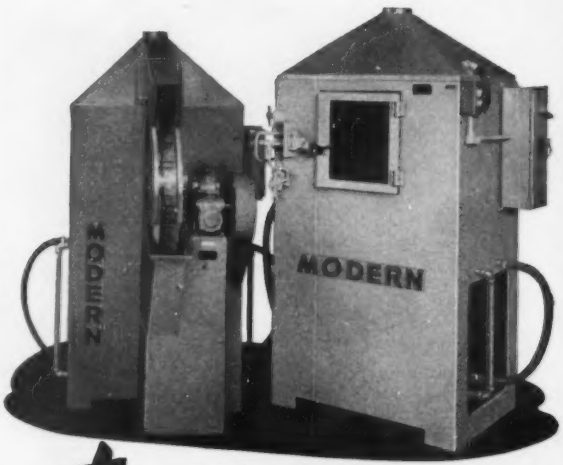
For this modern mill is one of the largest and longest-experienced makers of this product . . . *and no one makes it better.*

Bristol *Clock Brass* comes to you "on the button" . . . in large coils, without welds . . . with width and gage tolerances consistently uniform. And all gears and parts blanked from it are remarkably free from burrs.

Ask any manufacturer (and there are scores of them) who fabricates parts from Bristol *Clock Brass* . . . he'll tell you what we mean by "Bristol-Fashion."

THE BRISTOL BRASS CORPORATION has been making Brass strip, rod and wire here in Bristol, Connecticut since 1850, and has offices and warehouses in Boston, Chicago, Cleveland, Dayton, Detroit, Milwaukee, New York, Philadelphia, Pittsburgh, Providence, Rochester. The Bristol Brass Corporation of California, 1217 East 6th St., Los Angeles 21.

"Bristol-Fashion" means **Brass at its Best**



Larger parts are deburred in Maizo Blast machine (right) with stationary fixture. Operation is automatic when door is closed. Small parts are deburred in model with continuously rotating ferris-wheel type fixture (left).

Blast THOSE BURRS!
with Modern Maizo Blast

If you're being plagued with light burrs on high-production metal parts, get Modern Maizo Blast equipment and forget them.

Simply load the parts into a continuously rotating fixture if they're small—larger parts are placed on a stationary fixture in a door-operated model. The rest is automatic. A blast of high-pressure air containing ground maize or walnut shells quickly whisks off burrs. Proper blasting material enables you to deburr without pitting finished surfaces.

Outstanding performance and quality are notable features of Maizo Blast equipment. That's because it's made by the maker of the famous Burr-Masters, the fastest production gear burring and chamfering machines available. Modern has put the same "know-how" into the Maizo Blast design to give the utmost in operating efficiency.

Write today for Bulletin 103-57 covering Maizo Blast equipment for both small and larger parts.

MODERN
Industrial Engineering Co.
14230 BIRWOOD AVE.
DETROIT 4, MICH.

TUBE END FORMING MACHINERY
for
Beading — Flaring — Flanging — Expanding — Reducing — Sinking — Swaging — Grooving — Double Lap Flaring and Flanging 1/8" to 4 1/2" TUBING.

Write for General Bulletin G-3

The **VAILL** *Engineering Company*
137 E. MAIN ST., REAR **WATERBURY 20, CONN.**

Atlantic
RAKER SET BANDS
SAVE YOU TIME... AND MONEY!

Yes, the instant you order Atlantic Raker Set Bands you're in for cleaner, more precise cutting . . . you're dollars and hours ahead . . . you're due for more work per blade than you've ever had before — and here's why!

Raker Set Bands glide through the toughest metals with amazing accuracy — cut true clean through to tolerances as close as .002" — with "finished product" results on job after job.

Atlantic's individually milled, heat hardened teeth and ultra-flexible bands virtually eliminate checks and flaws — prolong band life, slash downtime.

FREE—Send today for the graphic story of Atlantic's family of fine saws. If you have a specific saw application you are wondering about, include a brief description — it will meet with interested engineering attention and be promptly acknowledged.

Atlantic
ATLANTIC SAW MFG. CO., INC.
Brewery St. New Haven, Conn.

ATLANTIC

ONE MACHINE

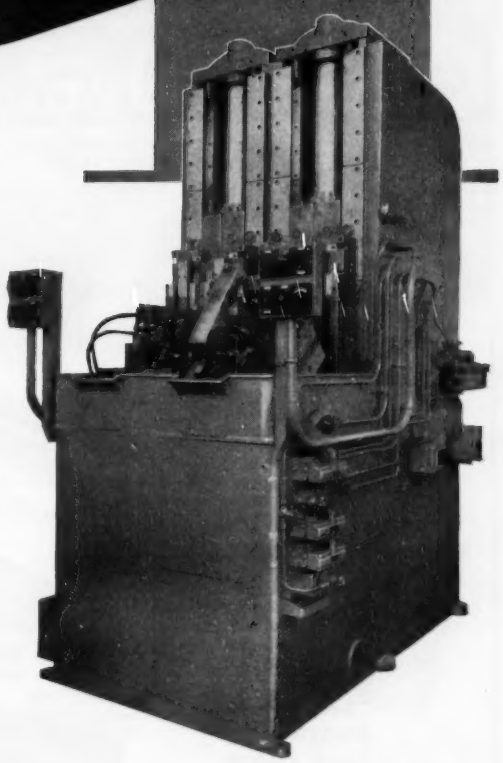
with interchangeable locators broaches 3 similar parts at 500 per hour

THE *American* WAY

Two, two-station base fixtures, mounted on tilting work tables, and arranged with automatic clamping, permit finish broaching the outside and inside faces of the ears on the sleeve yoke parts illustrated . . . at the rate of 500 parts per hour. Interchangeable locators makes it possible to broach any one of three similar parts on this American SBD-48-25 dual ram suface broaching machine.

The savings in time and the resulting low cost per unit are obvious. Such results, however, are typical when American engineers apply the knowledge and experience accumulated during the past 27 years to the practical solution of broaching problems.

Write, sending sample part or detail drawing and mention your hourly requirements. Our Engineering Department will be glad to furnish recommendations for the right machine and the proper tooling. And remember, American manufactures all three . . . broaches, machines and fixtures to give you a properly engineered, balanced solution to your metal removing problems. Address Dept. A.



AMERICAN

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

TO SPARK PRODUCTION

Model "D"

BORING

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ALL IN 1 TOOL-HEAD

A Boring Head that Won't Face is Not Complete

Write Today for Complete Details

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COMBINED BORING & FACING TOOL HEADS

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TIPPED TWIST DRILLS

SOLID TUNGSTEN CARBIDE ROUTER BITS

Willey's—The COMPLETE LINE of cutting tools — made complete in our own factories. Hundreds of standard sizes always in stock.

SPECIAL TOOLS

Excellent service on special tools built to your specifications. Send us your prints. You will receive prompt acknowledgement, quotation and delivery date.

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WILLEY'S CARBIDE TOOL CO.

MORE MAKERS OF WILLEY'S METAL

1342 W. Vernor Highway Detroit 1, Michigan

HOW TO GIVE METAL PRODUCTS THE RIGHT FINISH . . .

Here are economical, sales-building methods that produce more attractive products

SUPPLIES UP - TO - DATE INFORMATION ON:

—the techniques involved in metal finishing
—the commercial aspects of metal finishing
—the sales value of attractive finishes
—the economics of metal finishing
—the design of parts which require finishing
—new finishing equipment and processes
—metal finishing costs

HERE'S a manual which demonstrates the vital importance of the finishing process in the final appearance and sales appeal of a product and describes each of these processes in careful detail so that you may achieve an attractive finish as efficiently and economically as modern methods will allow. With special attention to improving results and reducing costs, the book covers all types of finish, such as galvanizing, polishing, plating, lacquering, enameling and painting—wood grain reproduction, chromium plating, and synthetic enamels, and many new finishes of a specialized nature.

FINISHING METAL PRODUCTS

By HERBERT R. SIMONDS
Consulting Engineer

and ADOLPH BREGMAN
Consulting Engineer, Executive Secretary, Masters Electric Plating Association

Second Edition

352 pages, 5¼ x 8¼, 147 figures, $6.00

The revised edition of this highly useful manual describes many new developments, and incorporates the rapid progress in plastics and synthetic resins. Chapters on coloring metal, on costs and estimates and on organic coatings have been added. Answers to every kind of question which arises in connection with the finishing processes are supplied in careful detail, aiming at the most efficient and economical means of achieving a highly attractive finished product with a maximum of selling appeal.

Read this partial list of chapter headings for a few of the important processes and topics described:

- Sales Value of Attractive Finish
- Importance of color
- How to Minimize Cleaning Expense
- Pickling for a Better Finish
- Polishing in Industry
- Designing Products to Reduce Polishing Expense
- Recent Developments in Plating
- Chromium Plating
- Spray Coating
- Electroplating Costs and Estimating
- Synthetic and Novelty Finishes
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- Porcelain Enamel

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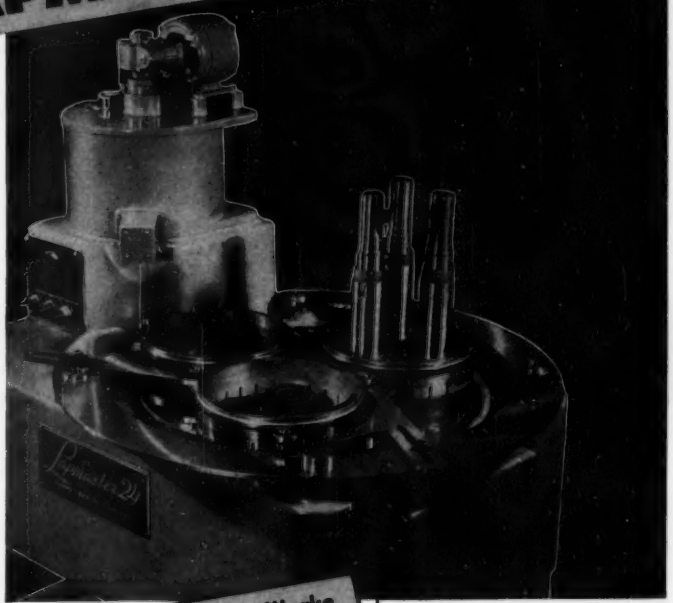
WHY YOU GET

Precision Flatness, Finish and Parallelity in Production Quantities . . .

WITH A LAPMASTER

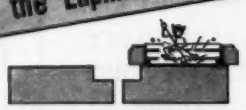


Here is the machine to do the job if you want precision flatness in production quantities at an economical rate. Lapmaster machines readily lap to the extreme close tolerance of one light band (0000116") or less. In addition, they produce an extremely fine finish to as low as 1 RMS.

Check these features and investigate the possibilities for the Lapmaster in your plant.

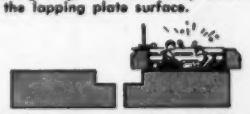
1. Operator requires no previous lapping experience.
2. Automatic timer provides controlled lapping cycle for production efficiency and allows time for pre-loading workholders.
3. Simplicity of design allows ease of loading and unloading.
4. Loose abrasive distributed evenly over lapping area insures uniform results.
5. Serrated lap plate collects and disposes of spent compound and removed stock.
6. Precision laps identical parts or parts of various shapes, heights and materials in one cycle.
7. Self-conditioning lap plate eliminates down time for truing or replacement.

How the Lapmaster Works



The work being lapped causes wear on heavy cast iron lap plate.

As the work is wearing the lap, the conditioning rings are continually conditioning the lapping plate surface.



Since the wear action of the conditioning rings is greater than the wear caused by the work being lapped, the flatness of the lap plate is automatically maintained.

FREE DATA

Learn more about the possibilities of production lapping and the interesting subject of measuring flatness. The illustrated fact-filled booklets are yours for the asking. Write today.

Crane Packing Company, Dept. AM-3, 1836 Cuyler Avenue, Chicago 13, Illinois

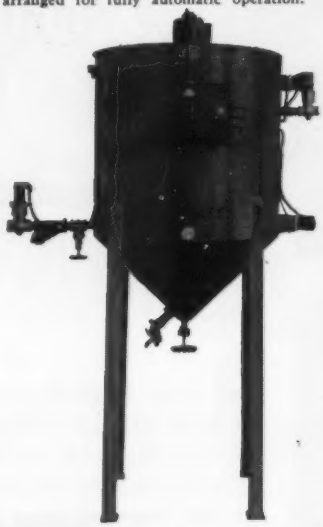
JOHN CRANE

CRANE PACKING COMPANY

PREVENT CONTAMINATION – EXTEND TOOL LIFE

with the NEW BARRETT COMBINATION STERILIZER AND SEDIMENT PRECIPITATOR . . .

Barrett Sterilizer and Sediment Precipitator arranged for fully automatic operation.



Protects your operators against infection—insures more and better work from your cutting tools—by sterilizing your cutting oils and precipitating sediment *at the same time.*

The NEW BARRETT STERILIZER AND PRECIPITATOR combines these two operations in one piece of apparatus which can be depended on to handle both operations effectively, efficiently and economically. Sterilization is by heat and is a positive active operation in the line ahead of the supply tank. By locating in this position, contamination is intercepted before the cutting oil is conditioned for safe, bacteria-free reuse.

Because of the heat to which the oil is subjected during sterilization, the viscosity of the cutting oil is reduced, thereby encouraging precipitation of minute heavy particles. The sediment thus liberated settles out and drops by gravity to the bottom of the sterilizer where provision is made to scrape the precipitated solids from the conical bottom and clean them out.

By thoroughly and constantly sterilizing and effectively removing solid matter, the Barrett Combination Sterilizer and Precipitator reconditions cutting oil for reuse; sterilized for safety's sake and abrasive-free for longer tool life.

GET COMPLETE INFORMATION NOW

These units are available for floor, wall and post mounting and are furnished with semi-automatic or full automatic control as required. Send at once for detailed information on this timely Barrett development.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE

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TELEPHONE: JAMAICA 6-4090

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1 in.

Write for illustrated bulletin.

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Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

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Wysong C-48, All-Steel, 5 Inch Rolls

Buy a Wysong . . . It's Miles Ahead

Wysong Series C, all-steel Bending Rolls feature: (1) A single handwheel in front of machine for quick, accurate, parallel adjustment of rear roll. (2) A safety treadle extending full length of front of machine. Stepping on treadle immediately stops machine. (3) A single lever to release or lock drop-end. Wysong rolls save time and steps. See your dealer or write to factory for full information.

Squaring Shears . . . Bending Rolls

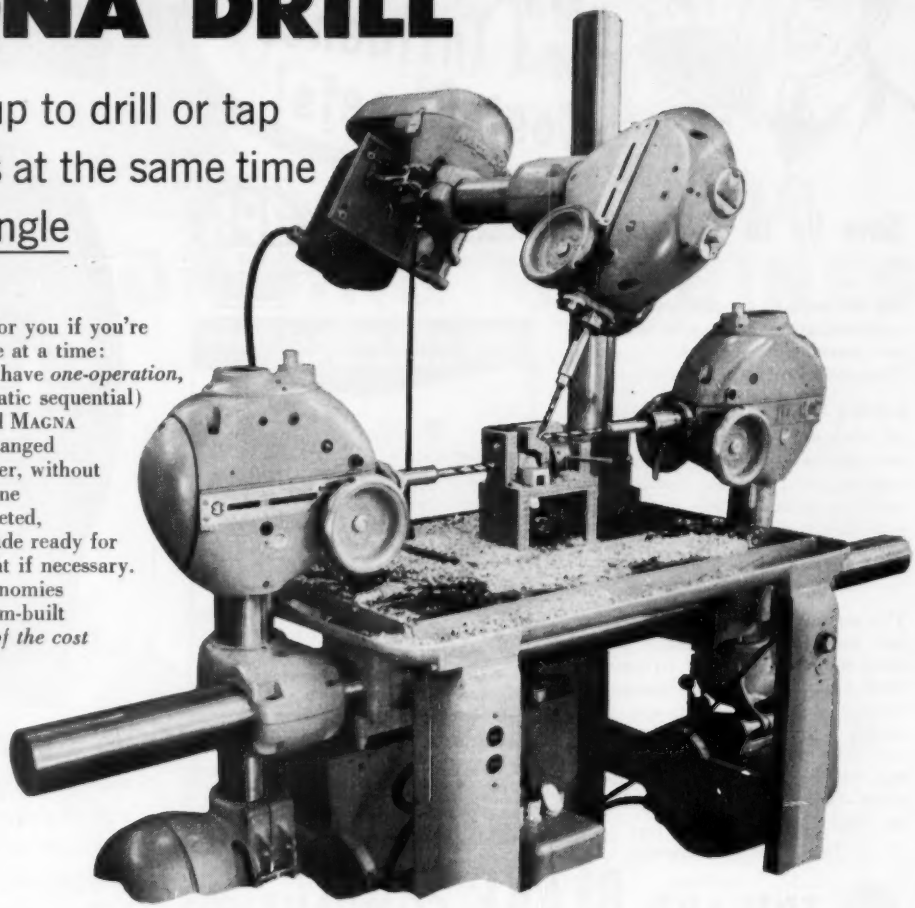
WYSONG

Wysong and Miles Company, Greensboro, N. C.

The one quick way to build a machine around any part...

MAGNA DRILL

Easily set up to drill or tap many holes at the same time from any angle

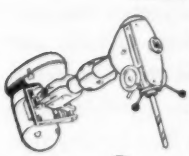


Here's important news for you if you're still machining holes one at a time: With MAGNA DRILL you have *one-operation,* simultaneous (or automatic sequential) drilling or tapping! And MAGNA DRILL can be quickly changed from one setup to another, without special tooling. When one production run is completed, MAGNA DRILL can be made ready for a different run, overnight if necessary. It brings you all the economies of special-purpose, custom-built machines, *at a fraction of the cost of such machines.*

MAGNA DRILL is your only *completely universal* drilling machine. Any number of independently powered heads can be mounted quickly and accurately for simultaneous operation. Each head has its own speed, feed and drilling angle . . . can perform any operation possible with a conventional drill using 1-hp. motor and 5" stroke.

See MAGNA DRILL demonstrated—if only to learn about its many cost-cutting features—how it can be fitted to any number of drilling operations on *your* production line. The coupon below will bring you complete information about this versatile machine, including specifications, technical data and the name of your nearest distributor.

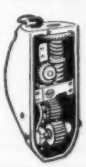
1001 QUICK SETUPS POSSIBLE WITH MAGNA DRILL MODULAR COMPONENTS



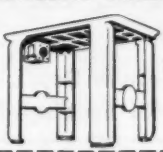
DRILL HEADS Standardized, adjustable heads can be indexed and locked at any angle or position *without special tools.* Variable throat. Right or left hand manual feed. $285*.

LEAD SCREW TAPPER consists of reversing starter with all controls; lead screw and nut assembly which replaces normal quill and control plate with limit switches. Installs in 10 minutes. $260*.

COLUMNS and BASES Line-bored cast iron; can be mounted horizontally or vertically. ⅜" walls. 3½" precision-ground tubes support drill heads. $48*.



POWER FEED (Mechanical Type) Attaches to MAGNA drill head in a few minutes. Feed rates .003" to .012" per rev. Solenoid engage. Spring return. Automatic cycling. $195*.



TABLES Drilled and tapped for mounting heads in variety of positions and for ganging tables in multiples. Single table, 24" x 20", $185*. Double table, 24" x 40", $285*.

**Delivered to your plant*

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Menlo Park, California

☐ Please send more information about MAGNA DRILL

☐ Please have representative call

*Name*_____

*Position*_____

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Win Profits and Influence Cost Sheets!

Save Up to 75% on Tap Costs with the B.P.S. SYSTEM OF TAP SHARPENING *

Are you paying too much — while other metalworkers cut tap costs by 50 to 75%, and more, with the B.P.S.* System? These same benefits are available to *you!*

B.P.S.* SYSTEM IS COMMONSENSE

All you need do is: (1) Sharpen flutes and chamfers of taps to an exceptionally high degree of accuracy (possible only on Blake grinders) and (2) Sharpen your taps at *regular planned* intervals.

HERE'S HOW THE B.P.S.* SYSTEM CUTS YOUR COSTS

This superior sharpening method gives your taps many times longer life. By using the Blake Chamfer Grinder and Blake Flute Grinder, your operator can sharpen each tap precisely — to match *exactly* a previously determined index and rake angle. Precision-sharpened taps cut much more accurately, with less strain—hence serve you more efficiently, far longer!

*Blake Precision Sharpening

HERE'S WHAT THE B.P.S.* SYSTEM CAN DO FOR YOU!

BLAKE CHAMFER GRINDER — BLAKE FLUTE GRINDER

- Gives much more production per tap!
- Greatly reduces tap costs!
- Provides greater tap accuracy and uniformity!
- Greatly reduces tap breakage and spoiled or unacceptable work!

INVESTIGATE THE B.P.S.* SYSTEM NOW!

Write us for reprints of *American Machinist* and *Machinery* articles on this subject. Descriptive folders on both Blake grinders also available.

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Black Diamond Precision Drill Grinders • Waltham Cutter Sharpeners • Surface Finish Standards

HOW TO RUN AN ENGINE LATHE

This 15-page *American Machinist* Special Report discusses engine lathes, and turning tools and operations. Many helpful drawings. 25 cents.

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IMPORTANT NOTICE

The Genuine MAUSER **VERNIER CALIPER**

IS NOW MADE OF **STAINLESS STEEL** THROUGHOUT

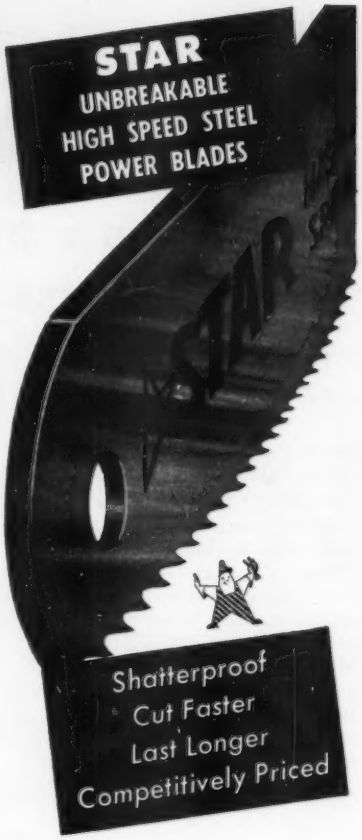
AND THE FOLLOWING IMPROVEMENTS HAVE BEEN ADDED
- HARDENED PHOSPHOR-BRONZE adjustable gib retains accuracy
- SPECIALLY LONG VERNIER to read thousandths
- 3 GRADUATIONS - 1/1000" - 1/128" 1/10 mm in back

$14.75 PPD

Request illustrated folder showing complete line of MAUSER Toolmakers Calipers, Height Gages, Bevel Protractors and Tool Stands.

GEORGE SCHERR CO., Inc.

200 AM Lafayette St., New York 12, N. Y.



For superior cutting performance with *safety*, insist on Star Unbreakable High Speed Steel Flexibles. No premium price for safety, fast cutting and long life.

They are made with a high speed steel toothed edge, welded by a special process to a flexible steel back. Eliminate tearing along weld—shattering—flying pieces.

Order Star High Speed Steel Flexibles from your Star distributor. And remember, he carries the leading lines of all kinds of tools and industrial supplies. And on extra-difficult metal sawing problems, he will quickly get a Star factory representative to help you.

Sold Only Through Recognized Distributors.

3233

CLEMSON BROS., Inc.

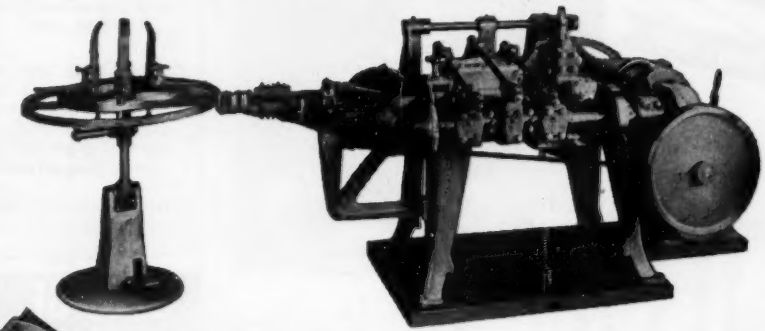
MIDDLETOWN, N. Y., U. S. A.

Makers of Hand and Power Hack Saw Blades, Frames, Metal and Wood Cutting Band Saw Blades and Clemson Hand and Power Lawn Machines.

NILSON FOUR-SLIDE

It's easy to get
HIGH PRODUCTION
. . . and UNIFORMITY, too!

Wire and Ribbon Metal FORMING MACHINES



UNIFORMITY in automatic production doesn't come by chance! In the case of wire and ribbon stock forming on NILSON 4-SLIDES, *it means control of the material from the coil to the final form.*

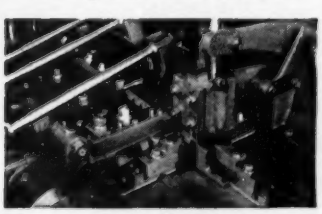
Parts, such as illustrated, are produced to tolerances of .002 at critical dimensions. Dies and forming tools, once installed (faster and simpler with NILSON'S open construction) maintain close tolerances for short and long runs. One machine! One set-up! Increased production! Maximum uniformity!

Model SF3 NILSON 4-SLIDE, shown above, with No. 51B Tilting Stock Reel, is a complete unit that can be set-up in any convenient location.

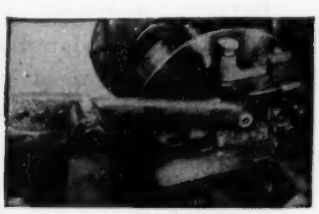
Range of sizes

Wire Forming —
1/32" through ½" wire. Feeds up to 32".

Ribbon Stock Forming —



Close-up of the NILSON forming section with the built-in Horizontal Press to the left. This design eliminates secondary handling and insures product uniformity because the sequence of stamping and forming is automatically controlled.



Close-up of the NILSON feed mechanism . . . capable of feeding wire and ribbon metal to tolerances of .001. Another important element in insuring product uniformity. Positive control is maintained over the material regardless the length of feed.

For specific recommendations — send details of your operation.

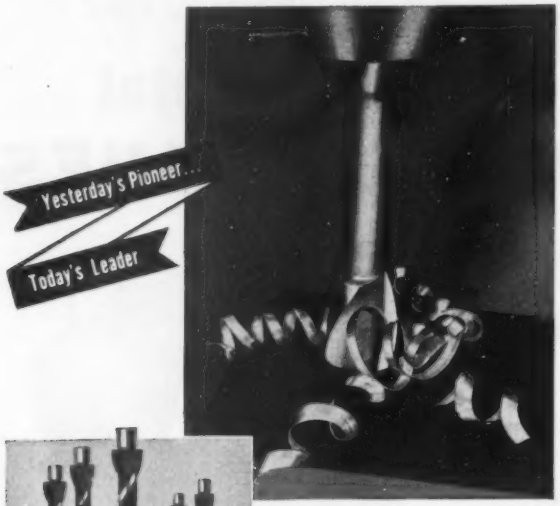
THERE'S NOTHING LIKE A NILSON

NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY
1519 Railroad Avenue • Bridgeport 5, Connecticut
CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • HAMILTON, ONT., CANADA

Automatic Chain-Making Machines • Automatic Staple Forming Machines • Wire and Stock Reels • Foot Presses • Wire Straightening Equipment • Slide Feeds for Presses

WELDON
"TU-LIP" COUNTERBORES



for

FAST, FREE CUTTING

As the name implies, WELDON "Tu-Lip" counterbores have only two cutting lips or flutes. This feature, together with the fast spiral, makes the "Tu-Lip" the fastest, freest cutting counterbore on the market.

Breakage due to clogging is prevented because this improved cutting tool provides more than ample chip room. Furnished singly in sizes desired or in convenient wood block sets as illustrated.

Weldon distributors throughout U.S.A. and Canada carry complete stocks to serve you.

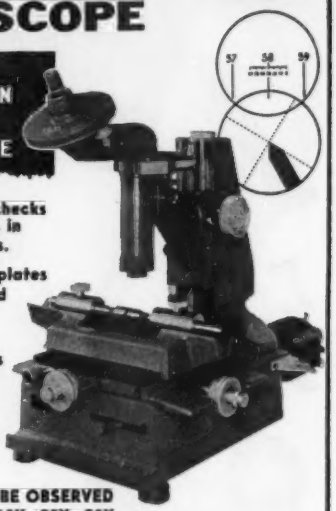
WRITE FOR LATEST CATALOG NO. 10.

THE WELDON TOOL CO. *Cleveland 4, Ohio*

3000 WOODHILL ROAD

NEW LEITZ TOOLMAKER MICROSCOPE

...PRODUCES HIGHEST PRECISION
....CUTS INSPECTION TIME



The NEW LEITZ DESIGN checks angular measurements in degrees and minutes.

Contains all Thread Templates for U. S. National thread profiles 6-80 pitch.

Contains Radii Templates from 21/64" to 13/16" by 1/64". Concentric circles from .010" to .280" by .010" and one blank compartment.

NOTE: TEMPLATES CAN BE OBSERVED IN 3 MAGNIFICATIONS: 10X - 20X - 30X

BE SAFE — SEND FOR LATEST BULLETINS

GEORGE SCHERR CO., Inc.
COMPLETE LINE OF PRECISION INSTRUMENTS
200 AM LAFAYETTE ST. • N.Y. 12, N.Y.

HAVE YOU READ YOUR . . .
1954 PRODUCTION PLANBOOK for Metalworking?

You'll find thousands of money-saving facts about efficient replacement programs there.

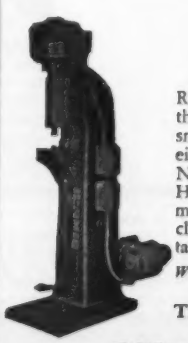
. . . BIG PRESS FEATURES

IN PRESS-RITE 5 TON POWER PRESS

This heavy duty Press-Rite does all of those 5 Ton jobs hour after hour, day after day . . . fast and at low cost. A real production unit. Low price. *Write for bulletin today.*

SALES SERVICE MACHINE TOOL CO.
2347 University Ave., St. Paul 14, Minn.

GRANT



RIVETERS — PIONEERS in their line—head rivets from smallest to ¾" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

"Yes ... figure Free-Machining ENDURO Stainless Steel is fully 90% as machinable as Bessemer screw stock"

You can give duplicate steel parts added strength and increased heat- and corrosion-resistance . . . and still get economical automatic production.

Simply convert to free-machining ENDURO Stainless Steel Bars. They're cold-finished by Republic's Union Drawn Steel Division to give you close tolerance, accuracy of section, uniform soundness, and fine surface finish . . . plus the high physical and chemical properties of stainless steel. Two grades are fully 90% as machinable as regular Bessemer screw stock.

Free-Machining ENDURO also is available in hot-rolled bars and in wire. Republic metallurgists give prompt, obligation-free assistance on applications, processing and use.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

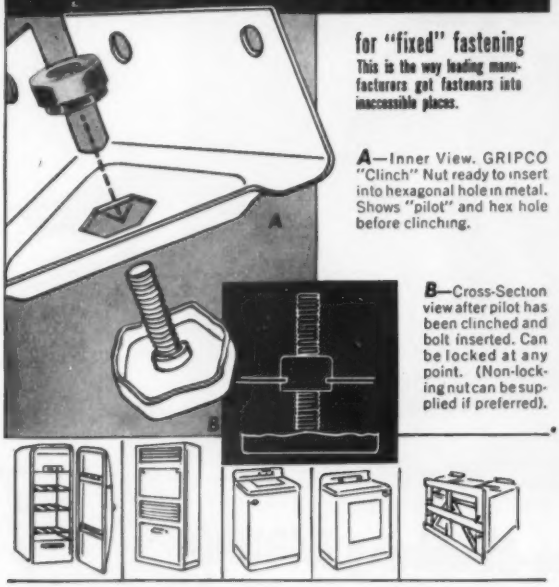
REPUBLIC ENDURO FREE MACHINING STAINLESS STEEL

REPUBLIC STEEL

Other Republic Products include Carbon and Alloy Steels — Titanium — Pipe, Sheets, Strip, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

how appliance manufacturers use

GRIPCO "CLINCH" NUTS IN "BLIND" ASSEMBLIES



for "fixed" fastening
This is the way leading manufacturers get fasteners into inaccessible places.

A—Inner View. GRIPCO "Clinch" Nut ready to insert into hexagonal hole in metal. Shows "pilot" and hex hole before clinching.

B—Cross-Section view after pilot has been clinched and bolt inserted. Can be locked at any point. (Non-locking nut can be supplied if preferred).

O Makers of washers . . . dryers . . . refrigerators . . . ranges . . . freezers . . . room air conditioners and many other appliances are enthusiastic over these new and better fasteners—Gripco "Clinch" Nuts. In many cases they do a double job—*first*, to hold the product rigid and safe in its container during shipment, with no risk of bolts "backing out"—and *second*, for holding the adjustable "levelers" after the appliance is delivered to the user. If you have any application with hard-to-get-at fastening or that needs additional threading depth for applying bolts to thin metals, investigate Gripco "Clinch" Nuts.

Where Welding is Available — You may prefer to use

GRIPCO Pilot Projection Weld Nuts
Circular pilot accurately positions nut in the bolt hole, for resistance welding. No jigs necessary. Two pilot heights for different gages of metal.

or GRIPCO Countersink Weld Nuts
The special countersink feature eliminates the possibility of hot metal particles lodging in the threads; thus no retapping is necessary.

6-POINT SECURITY AGAINST FASTENER FAILURE

GRIPCO LOCK NUTS

1—Firmly lock on to bolt at any position.
2—"Stay put" on bolt, in spite of vibration, tension, etc.
3—Positive locking action not due to any outside devices, but result of simple vertical thread deflection.
4—Oil or water do not affect Gripco locking action.
5—Can be removed with a wrench and reapplied repeatedly without loss of locking action.
6—Cost less because of simple design.

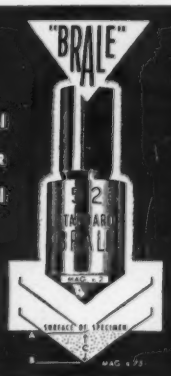
Write for samples, mentioning types and sizes of nuts you use. 400

GRIPCO **GRIP NUT COMPANY**
310-C S. Michigan Ave., Chicago 4, Ill.

an ACCO product

"BRALE"

Sphero-Conical DIAMOND **BRALE*** PENETRATOR for Hardened Steel



HOW IT WORKS

A. Minor Load Penetration
B. Major Load Penetration
C. Linear measurement of penetration increase which "ROCKWELL" converts to hardness reading

BRALE Penetrator Accuracy Is Proved in Wilson's Standardizing Laboratory

One point of hardness on the Rockwell C scale equals .00008", so penetrator accuracy must be constant. That's why Wilson maintains its Standardizing Laboratory for testing and approving every BRALE penetrator.

Each BRALE is precision ground to shape under high magnification to research laboratory accuracy. Wilson's BRALE Penetrator gives true readings at all dial points. For accuracy use a diamond BRALE penetrator on your hardness tester. Write for literature.

ACCO *Trade-Mark Registered

WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
230-B Park Avenue, New York 17, N. Y.

WILSON "ROCKWELL" and TUKON Hardness Testers

TOUGH STEEL STAMPS

WE KNOW THEY'RE TOUGH BECAUSE WE MAKE THEM THAT WAY.

● This is the kind of Stamps your Tool Makers and Machinists keep under lock and key.

ACROMARK Company

7-13 MORRELL ST., ELIZABETH 4, N. J.

NOW! HIGH SPEED STAMPING FOR HEAVY GAUGES

H & W DIEING MACHINE
Capacities: 25-ton to 2500-ton.

HENRY & WRIGHT *Division of Emhart Mfg. Co.*
481 WINDSOR STREET, HARTFORD 5, CONN.

Non-Circular Gears

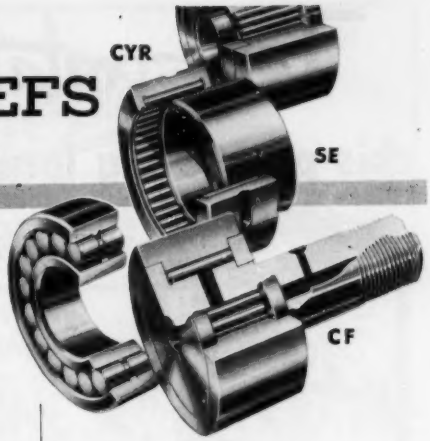
BILGRAM TRADE MARK

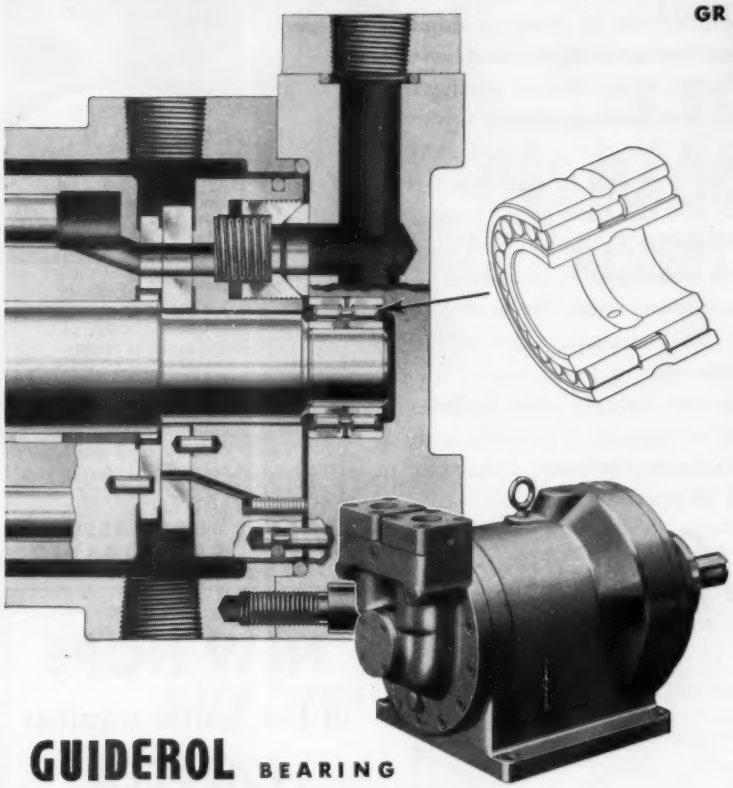
Including: Elliptic and Oval Gears

Also: Every Type of Gear
Any Quantity—Any Material

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

McGILL BEARING BRIEFS





GUIDEROL BEARING

used in pilot model Oilgear Motor

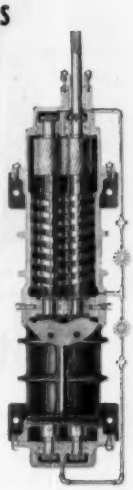
SHOWS NO WEAR AFTER 4000 HOUR TEST

The Oilgear Company, Milwaukee, Wisconsin, a regular McGill bearing user, has been testing a pilot model of a new 60 HP Axial Type Hydraulic Motor equipped with Guiderol Bearings for over a year. After 4000 hours of full load operation, the Guiderol Bearing used on the pilot end of the motor shaft was removed and inspected. It was still in perfect condition showing no internal wear.

This new line of lighter and faster operating axial piston units take advantage of the Guiderol bearing's assured freedom from skewing and extra load capacity in reduced radial bearing space.

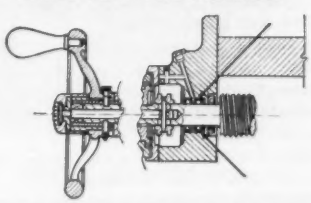
Mr. Ernst Wiedmann, Oilgear Chief Engineer, is enthusiastic about the performance of the Guiderol Bearings. He says: "They are the best full-type roller bearings for our hydraulic pumps and motors." As a result he is changing old specifications for this type of bearing to Guiderol and including Guiderol Bearings on all new developments.

WARREN-QUIMBY ADOPTS GR BEARINGS FOR MAXIMUM RADIAL LOADS



Warren Steam Pump Company has adopted Guiderol Bearings at five points of maximum radial load in this Warren - Quimby Vertical Screw Pump. The Guiderol Bearings have more load carrying capacity in the limited space available and enable vertical mounting of the pump without roller skewing or locking.

KEARNEY & TRECKER FINDS LIFE FACTOR INCREASED IN TABLE FEED APPLICATION



The life factor of the shaft bearing on the table feed screw of Kearney & Trecker Milling Machines has been increased by the simple process of changing to Guiderol Bearings. These bearings increased capacity, performance and bearing life.

BEARING SELECTION GUIDE

A new 140-page Bearing Selection Guide, complete with 30 pages of vital engineering data, has been released by the McGill Manufacturing Co. Ask for Catalog No. 52.

McGILL® — Precision Bearings

McGILL MANUFACTURING COMPANY, INC.

300 N. Lafayette Street, Valparaiso, Indiana

Transportation was this plant's big location problem...

A manufacturer of precision aluminum castings wanted to establish a new factory in the wealthy northeast market. Two basic requirements were set up for this plant. It had to be close to large L.C.L. shipping terminals, and also have good access to major arterial highways.

After consulting the Industrial Location Service of the State of New York, the manufacturer soon had comprehensive data on several sites with proper transportation facilities. With this information he was quickly able to choose the location that best suited his requirements.

What's yours?

No matter what your location problems may be, the Industrial Location Service of the State of New York will be glad to get you, confidentially and without obligation, the information you need to solve them.

YOU CAN GET AUTHORITATIVE DATA ON:

Raw Materials: Cost and availability of all materials and supplies you may need.

Transportation: Availability of facilities, cost of assembling materials and distributing finished product between any given points.

Markets: Industrial and consumer market data.

Labor: Availability, skills and rates.

Power, Fuel: Character and cost at any point.

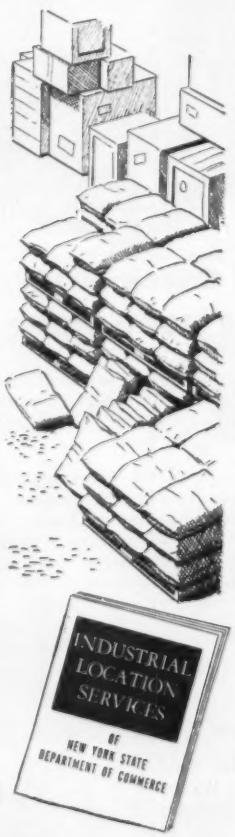
Available Buildings: Types, condition, facilities and terms. Confidential.

Sites: Availability, size, character, installed services; photos and maps. Confidential.

Community Services: A complete report on the facilities and attitudes of any community.

Laws, Regulations: Full data on laws or regulations for any particular form of enterprise.

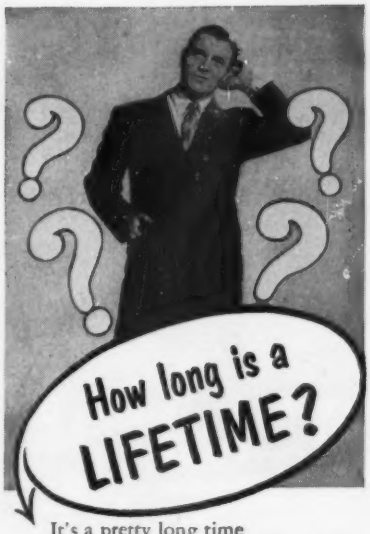
FREE BROCHURE AND MAP. Send for "Industrial Location Services," a full description of the valuable, detailed plant location information New York State will obtain for you. Large-scale physical map of the state and adjacent areas, showing elevations, transportation systems, watersheds, etc., will also be sent. Write New York State Dept. of Commerce, Room 814, 112 State Street, Albany 7, New York.



Industrial Location Service of

New York State

"WE DON'T SELL SITES—WE MATCH NEEDS"



It's a pretty long time when you apply it to the use of a Welding Torch. It means thousands and thousands of hours of use. Have you heard about the *Lifelong Guarantee* of Smith's Welding Equipment? Want to know more about it and what that kind of service can mean to you?

Drop us a card right away.

SMITH WELDING EQUIPMENT CORPORATION

Dept. AM-71, 2633 S.E. 4th St., Minneapolis, Minn.

NEW HOPE

in the battle against CANCER

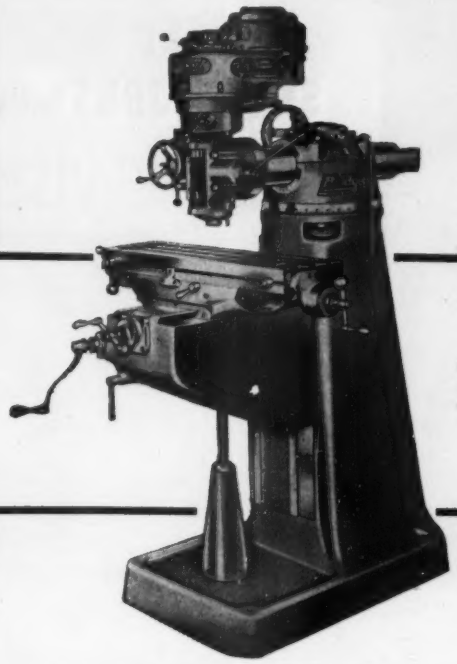
THE FIGHT against man's cruelest enemy is far from won. If present rates continue, 23 million living Americans will die of cancer—230,000 *this year*. And thousands of these will die needlessly—through cancer that could have been cured if treated in time.

ALL THE SAME, there have been victories. Thousands who once would have died are being saved—thanks, in part, to *your* donations to the American Cancer Society.

AND, LAST YEAR, the Society was able to allocate $5,000,000 of your donations to research aimed at finding the ultimate cure for *all* cancer. That's more money than ever before.

MUCH MORE, of course, remains to be done. So please make *this* year's gift a really *generous* one!

Cancer
MAN'S CRUELEST ENEMY
Strike back—Give
AMERICAN CANCER SOCIETY



The Bridgeport TURRET MILLING MACHINE

5 REASONS FOR THIS MACHINE'S REMARKABLE ACCEPTANCE RECORD

CONDENSED SPECIFICATIONS

8 Spindle Speeds . . . from 80 to 2720 RPM. Back geared Spindle Drive Unit . . . utilizes full power at all speeds without belt slippage.

Power Feed to Quill: 3 steps . . . .0015, .003 and .006 in. per spindle revolution. Quill Travel: 5"

Spindle Brake and Lock for convenience in changing tools.

Collet Capacity: up to ¾" diameter.

because:

1 . . . it mills, drills, bores and shapes without changing set up; milling head can be positioned at all angles over wide area.

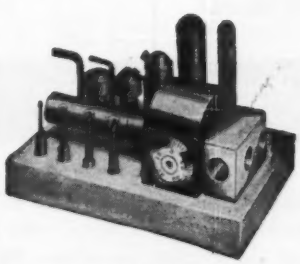
2 . . . it handles a wide variety of work more accurately and more economically and is applicable to tool room, die shop and production.

3 . . . it provides productivity over a maximum number of machine hours and is versatile with all-round handling convenience.

4 . . . attachments available provide outstanding range of utility.

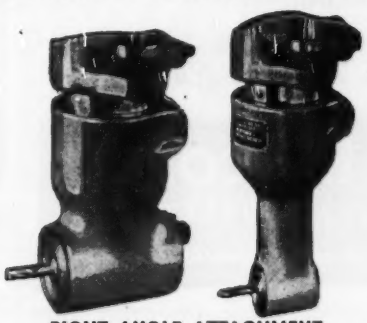
5 . . . moderate price puts it within reach of all shops large or small.

A FEW "BRIDGEPORT" ATTACHMENTS EXTENDING UTILITY



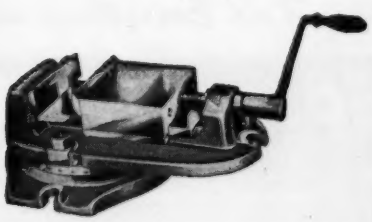
No. 2 BORING HEAD

Boring Tools and Holder provide means for boring holes up to 6" diameter; available for use on Bridgeport 1 HP Milling, Drilling and Boring Attachment.



RIGHT ANGLE ATTACHMENT

(Left) *Heavy Duty* . . . for milling and drilling at right angles; fits both Master and 1 HP Bridgeport Heads. (Right) *Light Duty* . . . for right angle milling and drilling narrow, deep molds and cavities.



MILLING MACHINE VISE

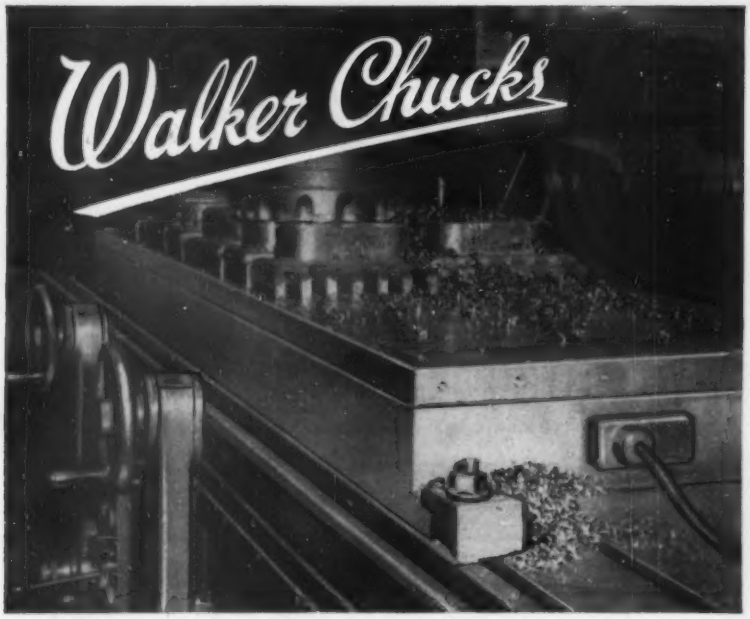
Improved and providing great gripping power with large diameter screw for rigid holding. Streamlined for appearance and equipped with coolant trough. Two sizes: 5" x 3½" and 6" x 5" jaw openings.

Ask your dealer . . . or us, to show how you can make the "BRIDGEPORT" pay handsome returns on your investment.

Bridgeport MACHINES, INC.

Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines



WALKER special magnetically controlled chuck eliminates magnetization of tool and machine

The unusual feature of this outstanding advance is chip control in milling and planing operations. This powerful special chuck holds for intermittent cuts on rough steel castings using approximately 50% of the available contact area between work and chuck face. Another notable O. S. Walker accomplishment.

Hold Everything with Walker Chucks

O. S. WALKER CO. Inc.

WORCESTER 6, MASSACHUSETTS

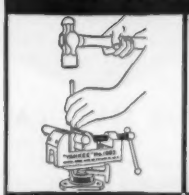
Original Designers and Builders of Magnetic Chucks

From the *American Machinist* Library of *Tips for Top Shop Men*

THE really competent man multiplies his effectiveness by every man he influences. One man, no matter how able, is still one man, but one man believed in by enough others is unbeatable.

SPEED UP SMALL JOBS with "YANKEE" VISES

"Yankee" 1993 Vise, removed from swivel base and held by "Yankee" Vise Clamp for drilling and tapping.



Bench-mounted on quick-release swivel base.

Machine-mounted with "Yankee" Clamp.

Sides, bottom and front end accurately machined.

Vise lifts on and off swivel base.

Line up small work just once in a "Yankee" Vise for a whole series of hand and machine operations. Four sizes ... 1½", 2", 2¾" and 4" jaw widths ... with and without swivel base. Hardened steel "V" block for round stock. Your industrial distributor has a full stock.

Write for The "YANKEE" Tool Book

"Yankee" Tools now part of

STANLEY

THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.

201 W. Lehigh Ave.

Philadelphia 33, Pa.

Specify **BESLY TAPS**

for Greater Accuracy and Dependability

One poorly tapped hole and this partially completed crankshaft becomes scrap! Quality taps have more than proven their worth on expensive parts like this crankshaft for one manufacturer of diesel engines. That's why Besly Taps are specified and used throughout the entire plant—to bring accuracy, dependability and *lowest tapping costs* to all kinds of tapping jobs. Besly Taps can give you better threads, higher production and longer tap life for lowest tapping costs in your plant, too. BUT YOU DON'T HAVE TO TAKE OUR WORD FOR IT—WE'LL PROVE IT! Let an experienced Besly Tap Engineer recommend a Besly Tap for your toughest job. This free trial demonstration will show you what Besly quality really means—and what it can mean on every tapping job in your plant. Ask your Besly distributor for this free trial demonstration or write directly to us.

Free—TAP TIPS

Get this handy HANDBOOK FOR TAP USERS. It's filled with up-to-date facts on tapping methods and tap selection. *Write for your free copy now.*

BESLY-WELLES
CORPORATION
Established as Charles H. Besly and Company in 1875
120 Dearborn Ave., Beloit, Wisconsin
BRANCH OFFICES & WAREHOUSES:
Chicago, Detroit, Cleveland

UNITED designs Dies to meet difficult drawing requirements

UNITED
DIES, TOOLS, JIGS and FIXTURES

UNITED accurately engineered dies are helping many manufacturers produce in quantity end products that meet specific requirements.

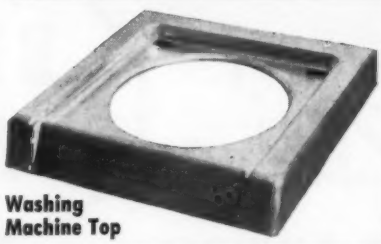
In many instances we have overcome deep drawing obstacles and have designed, developed and produced dies that not only meet exacting tolerances, but cut operating costs as well.

The two washing machine tops and dryer top illustrated are typical examples of work produced with United Dies. Large Cam Return Flange Dies were used to produce the correct flange form required for enameling in one operation.

If you are in the market for long lasting precision dies, consult UNITED. We have the Engineering Organization — complete Shop Facilities—and experienced "know-how" to produce precision dies that will enable you to solve difficult production problems.

Washing Machine Top

Dryer Top



Washing Machine Top

Contact UNITED on your Tool, Die, Jig and Fixture requirements

P. O. BOX 167 — DIAL 4634

UNITED TOOL AND DIE, Inc.

SALEM, OHIO

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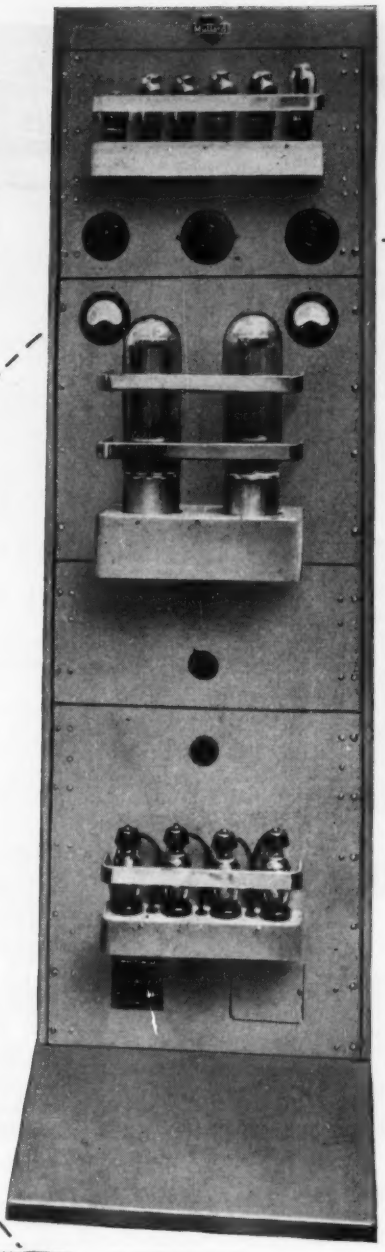
From the *American Machinist* Library of *Tips for Top Shop Men*

DON'T underestimate the effect of an unsound sales budget on production efficiency. Inaccurate forecasts mean fluctuating schedules, a changing work force, and low worker morale.

Ultrasonic Power for Industry



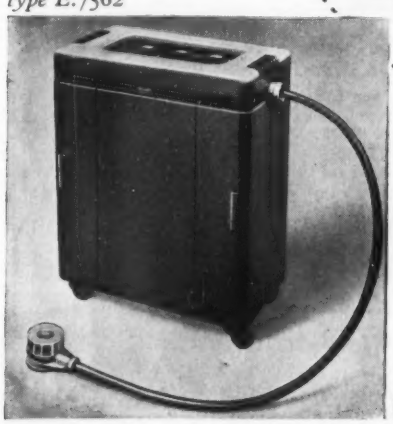
MULLARD, pioneers in the application of ultrasonic power to industry, now make available the first of a range of h.f. and l.f. ultrasonic generators that provide from 50W — 1kW ultrasonic power at frequencies in the range of 15 kc to 2 mc.

These equipments are already being successfully applied to such processes as the tinning of aluminum and its alloys, the rapid cleaning of small engineered parts that are either inaccessible or that require delicate treatment, and the dispersion of particles in liquid media.

In addition to these proved applications, high power ultrasonics offers interesting possibilities in research projects where cavitation phenomena or high particle velocities are required.

Research workers and development engineers wishing to investigate the application of ultrasonics to their own particular problems are invited to send their enquiries to the International Electronics Corporation at the address below.

H.F. Ultrasonic Generato. type E.7562



L.F. Ultrasonic Generator type E.7590

Mullard

SPECIALISED ELECTRONIC EQUIPMENT

A PRODUCT OF MULLARD LTD.

Distributors in U.S.A., International Electronics Corporation, 137 Hudson Street, New York, 13, N.Y., U.S.A.

Exported by : Mullard Overseas Ltd., Century House, Shaftesbury Av., London, W.C.2, England

Star Performer In The Reamer Field

Staples

CARBIDE-TIPPED

SHELL TYPE EXPANSION REAMER*

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Standardize on Staples Carbide-Tipped Circular Cutting Tools. You get longer tool life—greater accuracy—finer hole finish—and spend less time on tool servicing. Staples is the *quality* name in carbide tool production. You'll save money in the *long* run with Staples.

*Patented

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A complete line of Circular Carbide-Tipped Cutting Tools
Expansion Reamers — Special Tools

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at Eastman Kodak

The Eastman Kodak Company uses ELECTROSTAKE—the automatic solenoid-operated staking machine—to stake shutter parts for Brownie Hawkeye cameras. ELECTROSTAKE presses the assemblies together—then *automatically* delivers the staking blow. Better control of the impact cuts scrap . . . and because ELECTROSTAKE is faster and simpler to use, operators are able to stake far more shutter parts than they could on foot-powered machines.

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BLACK & WEBSTER, INC.

Dept. 3, 445 Watertown Street, Newton 58, Mass.
Solenoid-operated Production Tools

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RED-E offers the advantage of over 45 years of design, engineering and manufacturing experience. Only RED-E can serve your every Center requirement—regardless of size, taper, shank, style—and still GUARANTEE ACCURACY!

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"Don't have FITS over FASTENERS, have fasteners that fit."

For the finest in milled-from-the-bar cap screws—set screws coupling bolts and milled studs

don't get stuck—stick to the ones made by

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STRAIGHT SIDE SINGLE CRANK PRESSES

for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

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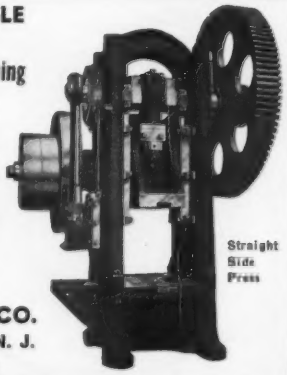
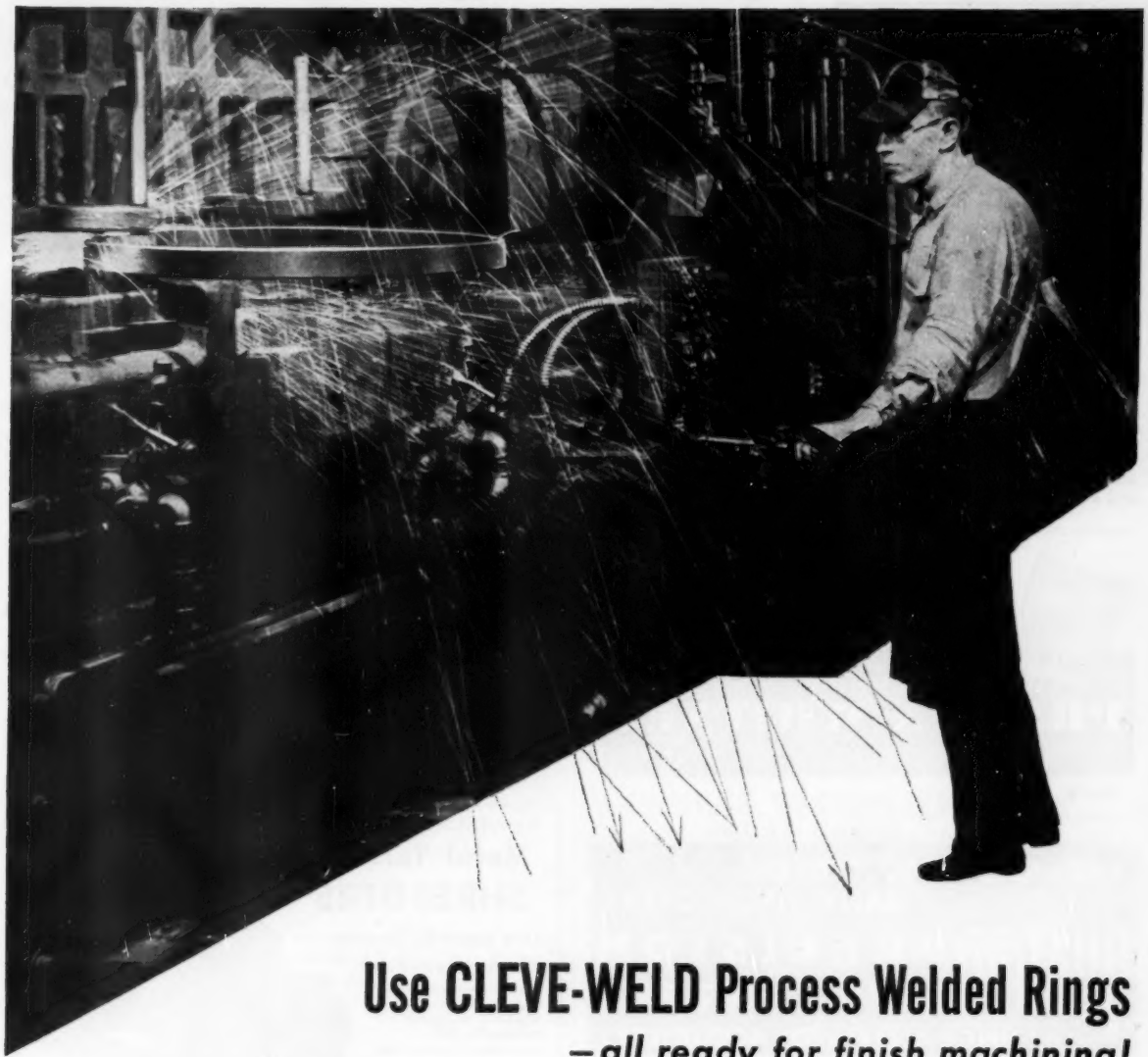


Straight Side Press

ZEH & HAHNEMANN CO.
NEWARK N. J.
180 Vanderpool Street



Use CLEVE-WELD Process Welded Rings

—all ready for finish machining!

AS COMPARED with other methods, this roll-and-weld process is able to produce preshaped, accurately dimensioned blanks that often do away with all rough machining and the expense of much excess metal. These blanks are stronger, too, because they have continuous grain flow throughout. Since they're practically free of subsurface defects, rejection of nearly completed parts is virtually eliminated.

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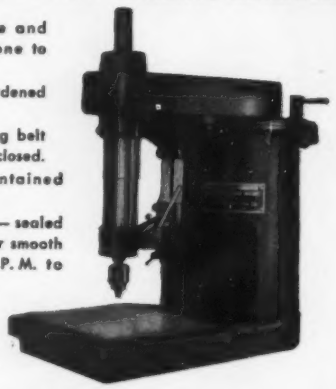
Send for our 28-page brochure describing the Cleve-Weld Process and illustrating our special facilities for serving you. And be sure to check with us on your needs for steel blanks from 6 to 48 inches in diameter and up to 2½ inches in thickness. Write THE CLEVELAND WELDING COMPANY, West 117th Street & Berea Road, Cleveland 7, Ohio. (Subsidiary of American Machine & Foundry Company, New York).

The CLEVE-WELD Process
for lower-cost circular steel parts

SIGOURNEY

M-100

THE PRECISION BENCH DRILLING MACHINE



ACCURATE because table and column exactly squared one to the other.
LONG LIFE because of hardened and ground spindles.
SAFE because motor, driving belt and spindles are entirely enclosed.
STRONG, RIGID for maintained accuracy.
SMOOTH AT HIGH SPEEDS — sealed ball bearings throughout for smooth operation from 4000 R. P. M. to 10,000 R. P. M.
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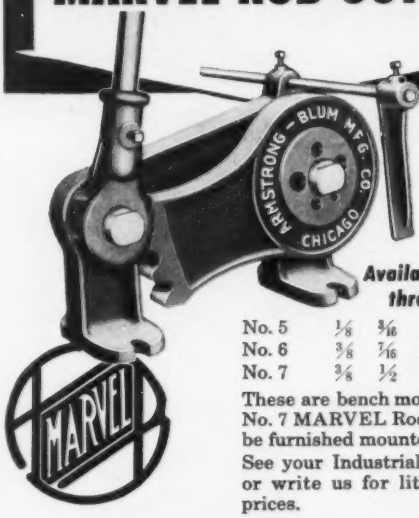
Just a single stroke!...
CUTS ROUND RODS ⅛" to ⅞" on a
MARVEL ROD CUTTER



Available in three models:

No. 5	1/16	3/16	1/4	5/16	3/8
No. 6	3/8	7/16	1/2	9/16	5/8
No. 7	3/8	1/2	5/8	3/4	7/8

These are bench models, but the No. 7 MARVEL Rod Cutter can be furnished mounted on legs. See your Industrial Distributor or write us for literature and prices.

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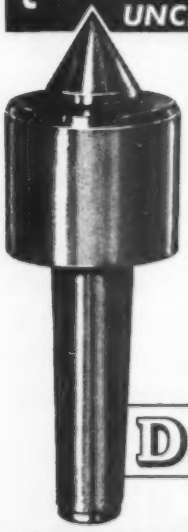
5700 W. Bloomingdale Ave. • Chicago 39, U. S. A.
Manufacturers of the outstanding MARVEL Metal Saws.

OUTLASTS DEAD CENTERS MANY TIMES OVER!
QUADRO PRECISION LIVE CENTERS
UNCHALLENGED ACCURACY!



Get every dollar's worth of production from QUADRO PRECISION LIVE CENTERS—designed to support the HEAVIEST load at HIGHEST speed for the LONGEST time! Guaranteed accurate to .00005"—they will outlast dead centers by far!

Each QUADRO CENTER completely eliminates friction—two double row pre-loaded ball bearings absorb combined radial end thrust. You'll discover its remarkable efficiency on a lathe, miller OR ANY OTHER MACHINE TOOL!

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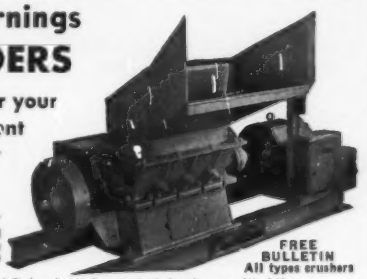
MANUFACTURER OF PROCESSING MACHINERY SINCE 1885

Metal Turnings SHREDDERS

Any capacity for your Plant requirement

Reduce BULK VOLUME of metal turnings by 80%

Note: Low head space and hinged protective gate on hopper of small "Series X Unit" (shown)



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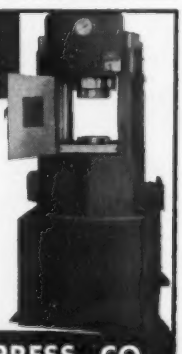
Exclusive simplicity of design plus many other exclusive features make Clifton UNITROL® Hobbing presses the number one choice of leading industries. Capacities 100 to 2,000 tons.

For complete details about all types of Clifton Hydraulic Presses and Pumps, write today for our 36-page illustrated catalog.

Illustrated: 600 ton UNITROL® Hobbing Press



CLIFTON HYDRAULIC PRESS CO.
290 ALWOOD ROAD CLIFTON, N.J.

Communist machine-gun fire dropped him in combat. But whole blood kept him alive, saw him through the hospital. He thanks you for his life.

She'd been exposed to polio. A new serum, *Gamma Globulin*, made from blood, helped ward off the dread disease. She thanks you for her life.

A tornado whipped suddenly across her home town. She was badly injured by falling debris. But a quick operation, several transfusions pulled her through. She thanks you for her life.

Three grateful people say: "we're HERE... because you were THERE!"

Each one of these people is alive today because someone gave blood.

If you've given blood before, you know how easy it is—how quick and painless. And you know what a wonderful feeling it is when you realize that what you've done may give another person his life.

Now you are asked to give blood . . . again and again. And you can do it safely every 3 months.

Because America's need for blood has increased enormously—for our armed forces, for accident and disaster victims at home, for new disease-fighting serums.

Many a life hangs in the balance! Will you help? Call your Red Cross, Armed Forces or Community Blood Donor Center today!

BUSINESS EXECUTIVES CHECK THESE QUESTIONS

If you can answer "yes" to most of them, you—and your company—are doing a needed job for the National Blood Program.

- ◯ HAVE YOU GIVEN YOUR EMPLOYEES TIME OFF TO MAKE BLOOD DONATIONS?
- ◯ HAS YOUR MANAGEMENT ENDORSED THE LOCAL BLOOD DONOR PROGRAM?
- ◯ HAS YOUR COMPANY GIVEN ANY RECOGNITION TO DONORS?
- ◯ HAVE YOU INFORMED EMPLOYEES OF YOUR COMPANY'S PLAN OF CO-OPERATION?
- ◯ DO YOU HAVE A BLOOD DONOR HONOR ROLL IN YOUR COMPANY?
- ◯ WAS THIS INFORMATION GIVEN THROUGH PLANT BULLETIN OR HOUSE MAGAZINE?
- ◯ HAVE YOU ARRANGED TO HAVE A BLOODMOBILE MAKE REGULAR VISITS?
- ◯ HAVE YOU CONDUCTED A DONOR PLEDGE CAMPAIGN IN YOUR COMPANY?
- ◯ HAVE YOU SET UP A LIST OF VOLUNTEERS SO THAT EFFICIENT PLANS CAN BE MADE FOR SCHEDULING DONORS?

Remember, as long as a **single** pint of blood may mean the difference between life and death for **any** American . . the need for blood is **urgent!**

NATIONAL BLOOD PROGRAM

GIVE BLOOD

...give it again and again

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(Classified Advertising)

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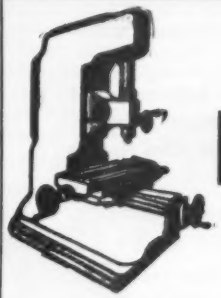

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This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

First, read the dealer ads on the following pages. A 5-minute study may locate the equipment now.

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Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

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3/15/54

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(Wanted)

With broad experience on tooling of small precision electro-mechanical assemblies for mass production. Must be A1 administrator. Responsibilities—tool engineering—toolroom—machine design and procurement—methods. Well established independent company, 1500 employees. Good future to man who can deliver. Submit complete resume. Replies confidential.

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Machinist method man who is thoroughly familiar with various types of turning equipment including knowledge of proper speeds, feeds and tooling for maximum production. If required, must be capable of running this equipment and training personnel. Accustomed to earning over $7000 annually. Plant located metropolitan New York area.

WRITE GIVING EDUCATION, EXP., REFERENCES AND SALARY REQUIRED.

P-1374, AMERICAN MACHINIST
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SALES REPRESENTATIVE WANTED

For short-run stampings, now making exclusive territorial assignments. Working knowledge of die practice desirable. Excellent opportunity.

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WANTED: MECHANICAL and Electrical Engineers—Designers. We invite you to call or write for an interview. Inquiries held in confidence. Monarch Machine Tool Company, "Builders of Monarch Lathes," Sidney, Ohio.

AIR TOOL sales & service man wanted by Detroit firm. Excellent opportunity for advancement for man with thorough knowledge of Industrial Air Tools. P-1840, American Machinist.

BUSINESS OPORTUNITIES

Executive will invest $25,000 to $75,000 with services in profitable business, preferably hard goods, distribution or wholesale; have office space in N.Y.C. BO-1926, American Machinist.

Machine Shop: job—Production runs makes jigs, tools, dies; A-1 accounts; good sales volume; repeat business; ample labor supply; 4800' bldg.; 7½ acres land; modern machinery; 35 miles east of Cleveland; priced right; terms arranged. Apple Co., Brokers, Cleveland, O.

ADDITIONAL EMPLOYMENT ADVERTISING ON PAGE 350

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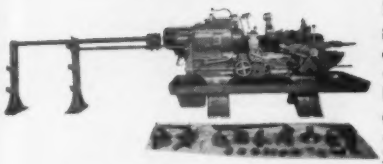
Every Item Guaranteed as Represented



No. 7 BARDONS & OLIVER Universal Turret Lathe. 2½" capacity. Preselector Head, Late Type.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 4 BROWN & SHARPE Motor Driven Automatic Screw Machine, 2" hole thru spindle with Tooling.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type.

12"x36" LANDIS Type "C" Hydraulic Universal Grinder, with Ex-Cell-O Internal Grinding Attachment, M.D.

6"x18" LANDIS Type "C" M.D. Hydraulic Cylindrical Grinder, Serial #29196.

6"x18" NORTON Vertical and Horizontal Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late Model.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

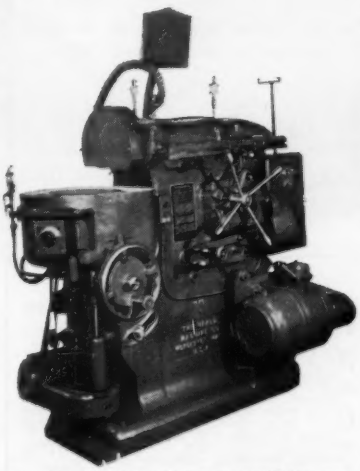
No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

No. 13LSI FELLOWS M.D. Gear Lapping Machine, with Detachable Head and Universal Work Support.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke, Motor Driven.

30 K.W. LEPEL High Frequency Induction Heater.

16"x54" centers AMERICAN Pacemaker Lathe, Taper Attachment, Late Model.



No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.

20"/27¾"x14' AXELSON Lathe, 115" centers, Taper Attachment, Late.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

24", 36" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

No. 2, No. 5 WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

#3A WARNER & SWASEY Universal Turret Lathe, Timken Bearing, 4½" Capacity, M.D.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

No. 2M CINCINNATI Universal Horizontal Mill, Full Equipment, M.D.

3" LUCAS Horizontal Boring Mill, V-belt motor driven.

42" Late Model KING VERTICAL BORING MILL

A.C. Motor Drive; 5 position turret head; Right Hand Side Head; 4 Jaw Chuck Table; Bijur System, Pendant control, New 1946. Excellent condition.

No. 5 FEDERAL Open Back Inclinable 4" stroke, Timken Bearing Flywheel, M.D.

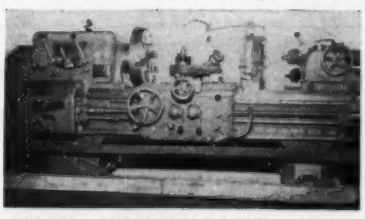
600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14" capacity, 17" diameter ram.

#5, #7, #8 JOHNSON O.B.I. Presses. 56, 79, 90 tons cap. M.D. Flywheel & Geared Type.

10"x10" RACINE #30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

No. 20, No. 30 WATERBURY FARREL Thread Rollers, ⅜", ½" cap., 1944.



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No. 5 Cincinnati High Power Plain, rect. overarm, a.c. m.d., feed control in knee, power quick traverse

No. 4 Cincinnati High Power Plain, rect. overarm, a.c. m.i.b., feed control in knee, power quick traverse

No. 4 Milwaukee D.O.A. Plain, a.c. m.i.b., p.r.t., Timken, #50 taper

No. 4 Cincinnati High Power Universal, a.c. m.d., div. hds.

No. 4-B Brown & Sharpe Heavy Plain, a.c. m.d., all geared

No. 3-B Brown & Sharpe Heavy Plain, a.c. m.d., all geared

No. 3 Cincinnati Dial Type Medium Speed Plain, a.c. m.i.b., p.r.t., Timken, #50 taper

No. 2 Cincinnati Dial Type Medium Speed Universal, a.c. m.i.b., p.r.t., Timken, #50 taper

No. 2-MH Cincinnati Rect. overarm Plain, a.c. m.i.b., Timken, #50 taper, speed range to 1200 r.p.m., new 1940

No. 36 Van Norman Ram Type, a.c. m.d., Timken, #50 taper, div. hds., new 1943

LATHES

68"x21' ctrs Niles-Bement-Pond Heavy Duty Grd. Hd., actual swing 68", screw cutting, 4-speed a.c. m.d., taper attachment

50"x26' bed Pittsburgh Hvy Duty Grd. Hd., quick change, taper, very clean

48"x33' ctrs Niles-Bement-Pond Heavy Duty Grd. Hd., screw cutting, 30 h.p. d.c. drive, taper attachment

36"x120" ctrs American 12-speed Grd. Hd., a.c. m.d., taper attachment

36"x96" ctrs Schumacher & Boye Triple Geared, cone drive, taper attachment

22"x74" ctrs Lodge & Shipley 12-speed Selec. Grd. Hd., a.c. m.d., taper attachment

20"x72" ctrs Lodge & Shipley 12-speed Selec. Grd. Hd., a.c. m.d.

19"x54" ctrs LeBlond "Regal" Grd. Hd., a.c. m.d., Timken, new 1940

19"x48" ctrs LeBlond Heavy Duty Grd. Hd., 12-speed, a.c. m.d., taper attachment

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7'-17" col. Dreses, a.c. Turner Uni-Drive

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A-1-8 Arter Rotary Surface Grinder, a.c. m.d., 8½" chuck, new 1943

24" Bullard "New Era" Vert. Turret Lathe, a.c. m.d., side head, p.r.t., threading attch.

Model G Cleveland Punch & Shear, a.c. m.d., 60" throat, capt. 2" thru 1"

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No. 572 Wysong & Miles Power Shear, a.c. m.d., 72"x16 ga., new 1947

No. 4 Fosdick 4-spindle High Speed B.B. Sens. Drill, a.c. m.d., 12" o.h., new 1941

50-ton WARCO O.B.I. Press, a.c. m.d., pneumatic clutch, new 1946, 4" stroke

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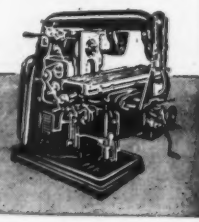

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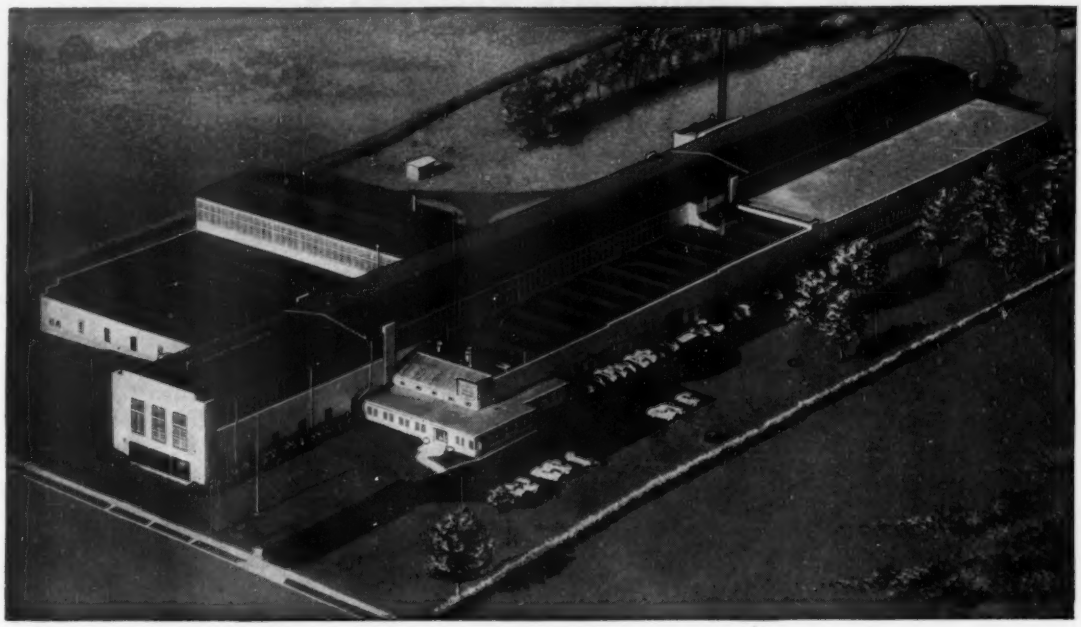

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Model B1—¾ H.P. Blount Speed Lathe, m.d.
W. C. Lipe Carbomatic, m.d.
Colborne Mfg. Bench Type Speed Lathe, m.d.
No. 4 LeBlond Boring Lathe, 37' bed, 4" hole, m.d., latest
No. 9, 12 LeBlond Multi-Cut, m.d.
4x60" LeSwing, m.d.
8x108" LeSwing, m.d., taper, latest
8x132" LeSwing, m.d., latest
9x12" Sundstrand, s.p.d.
11x18" LeBlond Rapid Production, m.d.
12x18" centers Monarch Model 5T, m.d.
Schauer Type NA 2B Speed Lathe, m.d., latest
30"x10' LeBlond Turning Lathe, cone
No. 12 Gisholt Semi-Special Automatic Production, m.d.

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No. 1B Milwaukee, m.d.
No. 1½ Brown & Sharpe Plain, cone, motorized
No. 2 Rockford, m.d.
No. 2H Milwaukee Plain, m.d.
No. 3 Heavy Kearney & Trecker Milwaukee Plain, m.d.
No. 3B Brown & Sharpe, m.d.
No. 4 Ohio, cone

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No. 00 Sundstrand Hydraulic Rigidmill, m.d.
3A Sundstrand Copy Rigidmill, m.d.
No. MM-1-6 U.S. Multi-Miller, m.d.
4" Pratt & Whitney Spline, m.d.
18", 24" Cincinnati Plain Automatic, m.d.
24" Cincinnati Duplex Automatic, m.d.
24" Garvin Cam or Form Milling Machine, m.d.
No. 2I Brown & Sharpe Automatic, m.d.
30"x24"x12' Ingersoll Planer Type Milling Machine, m.d.
48"x16' Newton Slab Miller, m.d.
54"x30"x16' Ingersoll Slab Miller, m.d.
Taylor & Fenn 2 spindle Spline Miller, m.d.

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14"x16" U6 Automatic Hob, m.d.
Hall Planetary, m.d.
6x20" Pratt & Whitney
10x24" Hanson-Whitney, m.d., latest

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No. 08 Cincinnati, m.d., latest
Newton Vertical Miller, rotary table
54" Ingersoll Single Spindle Adjustable Rotary Mill, m.d.
No. 4 Cincinnati Vertical High Power, m.d., Timken

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16" Cincinnati Circular Milling Table, p.f.
Kearney & Trecker Attach. for Milling Bridge Reamers, 62" long x 24" wide
1¼" Cincinnati Rack Milling Attachment for No. 3 Dial Type Miller
Vertical Attachment for Milwaukee Mfg. Type Miller
16" Kearney & Trecker Rotary Table, p.f.
Rack Cutting Attachment for No. 4 Cinti. H.P. Rect. Overarm Miller

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100 ton Wood Hydraulic Press, four col., single action
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600 ton Niles-Bement-Pond Wheel Press, m.d.
Chambersburg 30 ton Hydro-Pneumatic
Fast Feed OBI Punch Press #190 BI, 10 ton, 2" stroke
No. 1 Robinson OBI flywheel vee belt, m.d.
100 ton Chambersburg Hydraulic
No. A-2 Niagara OBI Punch Press, flywheel vee belt, m.d., 2½" stroke
No. 2 Robinson OBI Punch Press, flywheel type
No. 62 E. W. Bliss Duplex Press, m.d.

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No. 2 Hilles & Jones Horizontal Punch, m.d.
No. 6 Long & Allstatter Single End, m.d.
No. 7 Thomas Vertical, latest
No. 6½ Hilles & Jones Punch & Shear, single end, type G
Cleveland Shear, 72" gap, 18" blade, 1" plate
72" gap Cleveland Plate Punch
Wiedeman Pneumatic Punch, bench model

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20"x20"x3' Whitcomb-Blaisdell Planer, 1 head, m.d.
24"x24"x5' G. A. Gray Planer, belted m.d., 1 head on cross rail
24"x24"x6' G. A. Gray Planer, belted m.d., 1 head on cross rail
30"x30"x8' Cincinnati Double Housing, 2 rail heads
30"x30"x10' Cincinnati, belted m.d., 2 heads
36"x36"x10' Betts, belted m.d., 2 heads on rail, 2 side heads
36"x36"x10' Gray, Extra Heavy Pattern, m.d., 2 heads on rail
36"x36"x10' Niles-Bement-Pond, belted m.d., 1 head on cross rail
36"x36"x12' Betts, m.d., 2 heads
36"x36"x18' Niles-Bement-Pond, 2 heads, variable speed, m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
42"x42"x26' G. A. Gray, 2 heads, belted, m.d.
48"x48"x18' Niles-Bement-Pond, 2 heads, belt
48"x48"x18' Detrick & Harvey, 4 heads, reversing, m.d.
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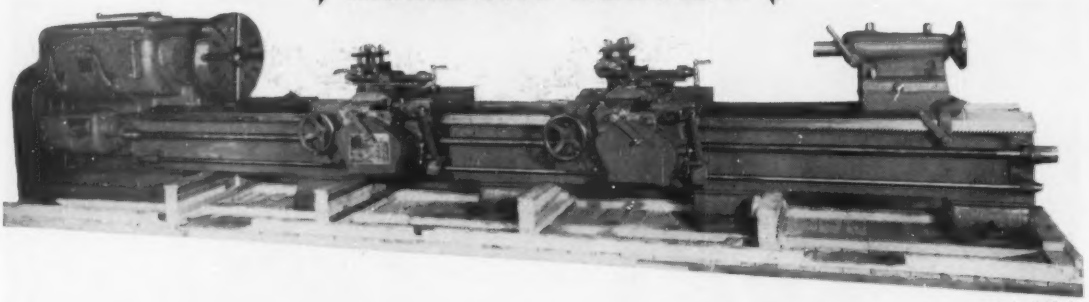

Actual Photo

1 Niles lathe 35" swing x 35' between centers, geared head, quick change, screw cutting, 2 carriages, rapid traverse, motors, chuck, etc. Serial #21778. Present day cost over $65,000. **$22,500.00**

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1 Niles lathe 35" swing x 6' between centers, geared head, quick change, screw cutting, 1 carriage, motor, chuck, etc. Serial #21999. Present day cost over $40,000. **$10,000.00**

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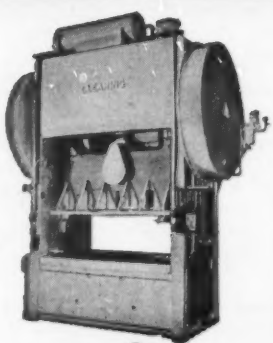

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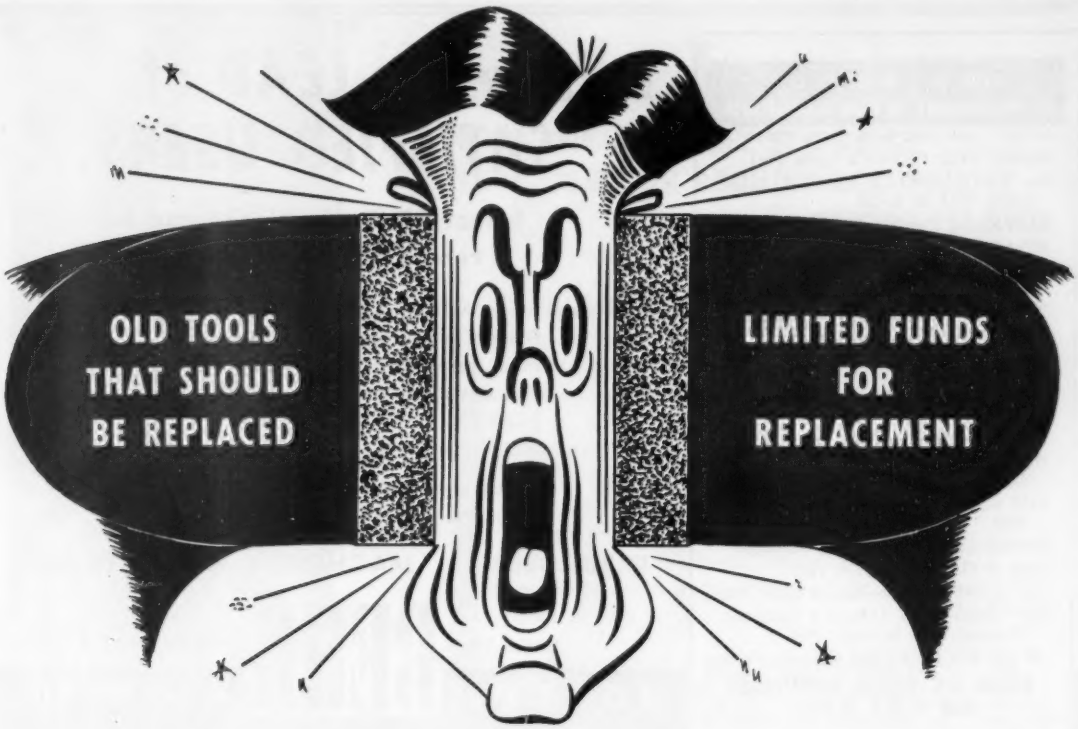

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2A W&S Pre. Turret Lathe Chucker, 1942
60"x16' PUTNAM Lathe
No. 47A HEALD Boring Mill, Late, 2 Spdl. S.E.
5" SELLERS 48x84 Table, 1942
8½D, 9J GORTON Mills, 1951
No. 2 CINCINNATI Mill, Vert. HSDT, 1943
No. 2 CINCINNATI GRINDER, Contour Cutter, 1946
16A BLANCHARD Grinder, 1944
No. 226 GARDNER Grinder, Disc, 1948, Excel.
6x18 Cyl. LANDIS Grinder, Plunge Cut, 1943
BARBER COLMAN HRS Hob Sharpener
Mod. Z FELLOWS Shaper, 1943
1⅞" CONE Screw Machine, 8 Spdl., 1942
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HP-100 LaPointe Horizontal Hydraulic Broach. 1945.
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No. 7 Gleason "Revex" Gear Rougher. 1943.
16"x72" Norton Univ. Grinder. 1942
TG 6"x36" Jones & Lamson Thread Grinder. 1943.
No. 35 Excello Precision Thread Grinder.
24-36 Bryant Hydraulic Internal Grinder. 1942.
No. 72A3 Heald Plain Hydraulic Internal Grinder. 1941.
No. 24 Mattison (Hanchett Type) Duplex Grinder. 1945
No. 10 Sundstrand Automatic Lathe F & R Slides. 1942.
No. 6DRE Potter & Johnston Automatic. Late.
No. H5 Libby Universal Saddle Type Turret Lathe. 1939.
No. 3R Gisholt Universal Saddle Type Turret Lathe. 1942.
No. M-18 Kearney & Trecker Simplex Mill. 1943.

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IL GISHOLT Universal Turret Lathe, 1946
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No. 2 CINCINNATI HS Dial Type Plain Millers
No. 0-8 CINCINNATI Plain Milling Machines
No. 2M CINCINNATI Vertical Miller, 1941
No. 1-18 CINCINNATI Plain Mfg. Miller
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No. 12 BROWN & SHARPE Plain Bed Type Production Miller
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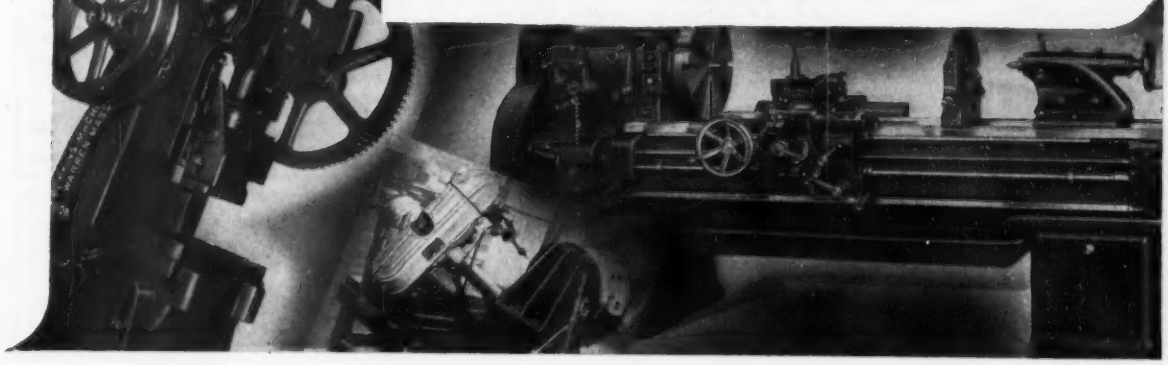

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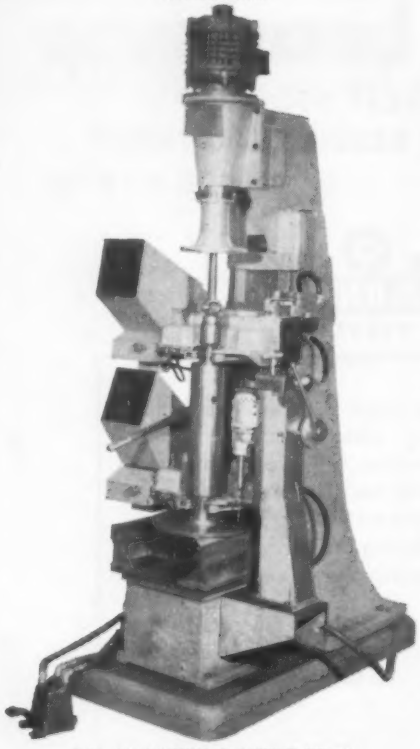

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South Bend 10" Toolroom model with underneath M.D., 1" collet cap., taper att.
Clausing 12" Precision Tool Room Lathe, new
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Kent-Owens No. 2-20 Hydraulic Prod. Mill
Sundstrand No. 00 Hydraulic Rigidmill, late
VanNorman No. 2-M Hand Mill, coolant, rebuilt
Taylor-Fenn, M-54 Duplex Spline Miller

MISCELLANEOUS

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No. 2 Bakewell Precision Tapper, 2" capacity
LaPointe No. 4L horiz. broach, 36 ton, 62"
8'x16 ga. Chicago steel hand bending brake
Pangborn No. 7 Type 8X2 Rotoblast, 1200# cap.
Barber-Colman #12 Type A Gear Hobbing Machine

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100" & 72" N.B.P., 2 hds., M.D.
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4'13" Col. Cinci. Bickford, M.-on-arm
GRINDER, 16"x96" Landis Hyd., Late
LATHES, 48"x29' & 24' beds Niles (2)
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Brown & Sharpe (3) Model 0G, ¾" capacity.
Brown & Sharpe (4) Model 00G, ⅜" capacity.
Ceco Screw Machine ¾" capacity.
Cleveland Model AA-11, Serial #36586.
Cleveland Model B, Serial #42618/843.
Cleveland B18—1½" Cap. Late.
Conomatic 4 Spindle, Serial #2309FF, 1½".

BORING MILLS
Bullard 24" V.T.L. Spiral Drive
Bullard 8"—8 spindle, Multi-Matic
Cleveland 2½" Bar Capacity, Defiance 3¾" Bar
Giddings & Lewis #32, 3" #25, 2½" Bar.
Kings 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
Niles-Bement-Pond 60" Vertical
New 3" Horizontal Boring Mill
3" Universal Boring Mill extra height

DRILLS AND RADIALS
American 6'x15" Universal, 4'13", 3'9"
Baker No. 321 Vertical Boring & Drill
Bausch Multi-spindle
Buffalo #2 Motor Spindle, #16—4 Sp.
Buffalo: Power No. 41, No. 42 RPMSTERS
Canedy-Otto 21" Sliding head, New
Cincinnati Bickford 6'15" col.
Edlund 8" Model 2B, Sliding Head
Natco #12, 20 spindle. Model B2A—10 Sp.
24" Sibley Sliding head
New Geared Box Col. Drills 24"
Foote-Burt #25 3" capacity
Leland-Gifford 2 LMS, 3 MS
Leland Gifford No. 2—4 Sp. Hyd. Feeds
Sigourney 2 spindle

ENGRAVERS
Gorton #ME, 1D, 3U, 3Z, Deckel G1L, G1, G2
Preiss UAM
Taylor-Hobson 3 dimensional Pantograph
New, 3 dimensional Deckel type

GEAR EQUIPMENT
Barber-Colman Mod. SHS, Sharpener
Barber-Colman #3, #2, #12 (3) also Type S.
Brown & Sharpe #3 Gear Mill, 26" Cap.
Fellows High Speed Shapers 712, 725, 71, 7, 61A
Fellows #20M Redliner, Flather 72" Cutter
Gleason Gear Rougher, Gleason #6 Power Tester
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
Gould & Eberhardt 36" Cutter
Michigan Gear Finisher 24" cap., 862-24A
Michigan 1708 Hob & Cutter 8"x24"
Mikron No. 79 Gear Hobbers
National Broach Red Ring Lapper, Finisher
Schuchardt & Shutte #1 Hobber

GRINDERS, SURFACE
New 9x24" Hyd. Feed 10x18", 6x18"
Abrasive 8x24", #33 Vert. & #34
Brown & Sharpe #5, #2 with Chuck
Gallmeyer & Livingston—65
Heald 22—12" chuck, Arter 12", Covel No. 15
Norton—6x18
Portman 12" Chuck Rotary—Reid #3, 11"x36"
Pratt & Whitney 12x36" Vertical
Taft Pierce #1 Precision • Thompson 6x18

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8 and 9 oz. Injection Moulders
125 Ton Southwark Press, Bed 96"x30". 30" stroke, 2 to 4 ft. opening
150 Ton Triple Action HPM Press
250 Ton Watson & Stillman 28x24"
300 Ton Watson & Stillman 24x29"
300 Ton Watson & Stillman 20"x20" Platen 8" St. 19" opening
600 Ton Williams & White 42"x60"
800 Ton Williams & White 42"x60"
800 Ton W&S Hobbing Press
All Hydraulic Equipment is completely engineered and checked by a competent staff thus assuring reliability.
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Brown & Sharpe #5, 3"x18" Cylindrical
Brown & Sharpe #13 Universal Tool & Cutter
Bryant #5 Internal, chucking
Cincinnati 6x18" Hyd. #4—Centerless—#2
Douglas Tool & Cutter 8"x15"
Gardner Disc Grinder 30"—15 H.P. Motor
Grenby Models 1G1 & 1G2—Internal
Gorton Ped. Type Tool Grinder Mod. 375-2
Heald #73 Internal Centerless, #75A Internal
Heald 72A3 Int. Centerless Sizematic
J. & L. Thread; TG615, Lempco 54" Swing
Landis 6"x30" Type C Cyl., 10x24 Univ. 12x30
Norton #2 Tool & Cutter, No. 1 Tool & Cutter
Norton Type C 6"x18" Semi-Automatic cyl.
Norton 10"x18" Type C cylindrical, 6"x30" Cyl.
Norton 14"x96" cyl. 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer
Pratt & Whitney Radius Model R6
Sellers 6-G Drill Grinder, 6G Tool, K.O. Lee tool
Van Norman #666 Crankshaft

LATHES
American 12"x30", Bridgeford 36"x20", 32"x16'
Cincinnati 22'x10', 26"x12'—Bertram 26"x10'
Boyes & Emmes—24" G.H.—Bradford 16"x36"
Gisholt Simplimatic 18"x16½", 2 Tables
Henday 12"x42" and 12"x30", 17"
LeBlond Regal 10"x3' bed, 13x42", 17" Late type
LeBlond 25/50x96" Gap, Late type.
Lipe-Carbo 12"x18" (2)
Lodge & Shipley #3A, Duomatics
Pratt & Whitney 16"x60, 10"x20", 16"x36
Monarch Magna-matic 14"x54", 20"x48"
New 16, 18, 20", 28" Immediate Del.
New Tool Maker 10x24", South Bend 9"
Rivett Model 918 Precision. Mod. 715
Putnam, Sliding Gap 22"/46"x92"
Sebastian 14"x6", So. Bend 13"x42", 14"x28", 16"x8'
South Bend 13"x5' Q.C.G., 10"x3½ Taper Att.
Sundstrand 8x15", 15' Stub
Wickes 32"x35' Geared Head

MILLS, PLAIN, UNIV. PROD.
New #2, Univ. Dividing Hd.
Brown & Sharpe #0 Omniversal, #000 Production
Brown & Sharpe #2B Plain, No. 2, 3A, 21 #2L
Cinn. 08 Rise & Fall, 2-24 Automatic
Cinn. #3, 4 Plain, #18 Mfg. #5-48 Hydro.
Kent Owens IV, 1-8, 1-14, 1M, 2-20
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Universal, 2H Plain
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Head, Mod. 1-18
(8) Van Normans #12—Hor/vert—Late

MILLS, VERTICAL
Cincinnati (2)—1-18 Plain Automatic
Cincinnati #3, 08 Vertical
Cleveland No. 1 table 8"x32"
Gorton 8D Super Speed
Milwaukee 4K & 2K
Morey #12M Profiler, 2 sp. #2 Maximiller
Reed Prentice Vert. Mill & Die Sinker Mod. 3VG
Taylor & Fenn Vert. 6"x18"

PRESSES
Bliss No. 1 Double Action Drawing Presses
Bliss 650 Hi-Production Presses
Bliss 18, 19, 21, O.B.I. 58, 62, 162, OB
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Horning, 15 Ton—Toledo 32 Ton Horning
Niagara A1¾, O.B.I., Niagara No. 27
Stokes Tablet Presses, Mod. R, RD3, RD3S, DDS.
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, LI #3
Z & H #4½, O.B.I. 20 Ton

TURRET LATHES
Bardons & Oliver #2, 3, 7 Bar Feed
Brown & Sharpe, #2 Hand, #10, 11
Foster #2B 2½ Cap. Morey #2G Late
Gisholt 2L, Cross Slid. Tur.
Gisholt #5, Bar Feed, Plenty of Tools
Gisholt 4R—9¼" hole in spindles
Jones & Lamson, Mod. 8A, No. 5
Libby 1 HS with threading att.—3R, 4R
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1, 1A, 2, 2A, 3, 4, 5

MISCELLANEOUS
Band Saw: New Kalamazoo & Johnson, Grob.
Bending Roll: Reed-Power 5", 48"—8 ga.
Bolt & Pipe Threader: Landis, Oster-Williams
Broach: New 6 Ton Horizontal, 11 Ton Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"
Jig Borers: New Swiss
Keyseater: Davis, Baker
Pipe Bender, Kane & Roach, Parker tube 1½" Cap.
PLANER: Niles-Bement-Pond 36x36'x10'; Gray 24"x24"x8'; Detrick & Harvey 40x90"
Rotary Table: Cincinnati, power take-off
Saw: Shaping 6x6", 13x13", Tannewitz Cut Off
Scrap Cutters & Granulator: Bell & Jewell
Shears: New 14x72, Niagara 10x3/16", 12'x3/16"
Thread Miller, Coulter Hob, 1952
Welders—Arc-Spot-Seam

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#36 Van Norman Miller, Late
42" Bullard—Late
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24" No. 321 Baker heavy duty
No. 310 Baker heavy duty
Natco double end horizontal, 2 way
12 spindle No. 12 Natco multiple
22 spindle No. 14 Natco multiple
34 spindle No. A16 Natco multiple
30" swing Allen power feed sensitive
No. 36HO Baker vert. hyd. drilling & boring
No. 15½ Foote Burt hydraulic vertical
No. B250H Natco hydraulic vertical
3½' arm 8" column American sensitive radial
4' arm 15" column Carlton M1B radial, late
6' arm, 3' extension, 16" column American radials, late type (two)

GEAR HOBBERS

No. 3 & No. 12 Barber Colman
Type A Barber Colman universal
No. 12H Heavy Gould & Eberhardt universal
No. 36H Gould & Eberhardt
18" Cincinnati spur and spiral
8"-10" No. 1 Lees Bradner
No. 7S Lees Bradner
No. 3 Adams Farwell
72" S. & S. universal

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8" Red Ring Gear Shaver, two, late
8" Red Ring gear lapper
No. 60 Cross gear tooth rounder
Barnes "Mal" Hut O Lap gear lapper
National Cleveland gear checker
100"x24" Newark No. 7 spur gear cutter
18" Pratt & Whitney hydraulic gear grinder
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Illinois gear measuring machine
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GRINDERS

No. 2 Cincinnati centerless, plain and Filmatic bearing
10"x18" Cincinnati Filmatic bearing
10"x18", 10"x36" & 10"x72" Norton cylindrical
12"x36" Cincinnati universal cylindrical, serial 1U-3D-1D-5
16"x96" Landis cylindrical
16"x96" Landis cap type cylindrical
No. 120A Gardner opposed spindle disc, 20"
25" No. 84 Gardner opposed spindle disc
52" No. 24A Gardner horizontal disc
72" No. 179 Gardner horizontal disc
30" No. 8 Badger double disc motor on spindle
No. 72A3 Heald plain hydraulic internal
No. 72A3 Heald Gagematic internal
No. 72A3 Heald Sizematic internal
No. 3 Bryant internal
5"x18" Norton vert. spindle hydraulic surface
8"x22" No. 3 Abrasive surface
12"x48" Model 300 Hanchett surface
No. 3 Barber Colman hob sharpener
10" Pratt & Whitney hydrau'c gear

LATHES

24"x14' bed American GH, QCG, serial 44070
12" Sundstrand Stub lathes (three)
No. 3A Warner & Swasey long bed universal T/L, late
H5 Libby International saddle type universal T/L, late
Leonard hydraulic tube spinning lathe, new 1947
14"x42" Hendey CamLoc, timken, toolroom
14"x18" Lipe HS Carbo-lathe, new 1943
17"x6' LeBlond Mfg. timken, (three)
48"x52"x20'6" Niles Bement Pond engine lathe, like new

MILLING MACHINES

No. 2L Van Norman universal, vertical head, late
No. 22L Van Norman universal, vertical head, late
No. 3 Sundstrand Rigidmill production
12" Cincinnati plain manufacturing, also 18"
24"x24"x12' Ingersoll adjustable rail planer type mill. mach., tracer controlled, new 1945
4—36 Cincinnati Hydromatic production
4—46 Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 1 Milwaukee vertical mill
No. 2B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain

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56 ton No. 304 Bliss, SS, solid frame, new 1942
60 ton No. 81 Cleveland, OBI (two)
88 ton No. 50-D-36 Cleveland, DC, steel frame
95 ton No. 7 Hamilton, OBI, steel frame (three) new 1947
125 ton No. 306 Bliss, SS, tiered frame
180 No. 94½ E Toledo, DC, tiered frame
500 ton No. 1042 Verson, SS, all steel, air clutch, late model
650 ton No. DA 8411 Hamilton SS, toggle drawing

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16" American
16" American Heavy pattern Auto-oiled
24" Cincinnati Climax heavy duty
26" Morton draw cut shaper
32" G & E shaper

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CINCINNATI #6A, 62" x 20" Auto., motor.
CINCINNATI #7A, 84" x 24" Auto., motor.
CROSS #1, 40, 45 Gear Tooth Rounder; M.D.
DETROIT type GG-35 Gear Grinder; lathe.
FELLOWS #6IA, 822, 75, 7A, 77, 48, H.S. Gear Shapers; late.
FELLOWS 13LS Lapper, motor-drive; late.
GLEASON 12" Straight Bevel Gen.; late
GLEASON 3" spiral bevel gear, gen.; M.D.
GLEASON 25" Straight bevel Generator; M.D.
GLEASON 24", 32" Bevel gear planers; M.D.
GLEASON #24 Straight Bevel Gear Generator; late
GLEASON #6 Revacycle, late type.
GLEASON #13 Hypoid cutter sharpener; late.
GLEASON #14 Spiral bevel Hypoid gear grinder; late.
GLEASON Model 17, Hypoid, Spiral Grinder; M.D.
GOULD & EBERHARDT 12H Gear Hobber; late.
GOULD & EBERHARDT 18H Gear Hobber; M.D.
GOULD & EBERHARDT #36BM 3-spindle auto. gear rougher; M.D.
GOULD & EBERKARDT 120-M Double stanchion; M.D., late.
MICHIGAN Model 854 gear shaver, rack type; M.D.
MICHIGAN Gear Finisher, M.D., 862-24-A; late.
PRATT & WHITNEY 10" Gear Grinder; late.

LATHES, Engine & Mfg.

AMERICAN 36" x 150" centers; M.D., late.
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DENHAM 16" x 72" centers, Gap; late type.
HENDEY 16" x 42" centers, M.D., late type.
HENDEY 16" x 54" centers; M.D., late type.
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SUNDSTRAND 19"x80" centers; automatic; late type
SWIFT 16" x 72" centers; late type
U.S. model 810B Cutter Reliever, 8" cap; late.

LATHES, Turret

GISHOLT 1L Universal; Timken, M.D., late
GISHOLT 2L Universal; Timken, M.D., late
MOREY #2 & #4 ram type, Timken; late
WARNER & SWASEY Univ. Pressolestor No. 5, late

PLANERS:

METTS (Consolidated) 108" x 84" x 44"; 4 hds; PRT; box table; M.D.
CINCINNATI 96" x 96" x 18' Hypro Openside NEW 1944
CINCINNATI 72" x 40" x 14', 2 rail hds, 1 side hd, M.D.
DETRICK & HARVEY 48" x 48" x 18', 4 hds; hydr.
GRAY 24" x 24" x 66' motor drive.
GRAY 36" x 36" x 10' double housing "Maximum service," M.D.
LIBERTY 144" x 76" x 48' adj. variable openside, box table, 4 hds. PRT, M.D.
NILES 48" x 48" x 12' "Time Saver," 3 hds, late.
NILES 108" x 84" x 42' 4 hds. PRT, box table, D.C.
N.B.P. 72" x 72" x 30'; 4 hds. P.R.T. M.D.
NILES 48" x 48" x 10' double 4 hds; PRT; M.D.

PRESSES:

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BESCO #EB2, 18½-ton cap., back flywheel; NEW.
BESCO #EB4, 40-ton cap.; back flywheel; NEW.
BESCO #21, 40-ton capacity; OBI; NEW.
BIRDSBORO 325 ton, 31 x 31 bet. upright; hydr.
BLISS 3½ ton straight side toggle; late type.
BLISS 26 Straight side, 135-ton cap. 100" bet. uprights, M.D.
BLISS 525-ton cap. #410A dble action toggle drawing press.
BLISS #305 Straight Side Single crank; late.
HANNIFIN 6-ton; 18 ton; hydraulic; late.
HENRY & WRIGHT 25-ton dising machine.
SHAW 250-ton hydr. flanging press; late.
WATERBURY FARREL 29 125-ton cap. blanking

MISCELLANEOUS:

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BAKER No. 5 Keyseater; motor drive.
BARNES No. 172, 214 Honing; M.D., hydr.; late.
FISCHER No. 1 Oil Groover; M.D.; late.
LANDIS 2" Double Spdle. Threaders.
LeBLOND No. 2 Deep Hole Reaming, late type.
LeBLOND No. 2 Deep Hole Rifling, late type.
MANVILLE No. 3 Bolt Head Trimmer, M.D.
MANVILLE 2C Screw Slotter, Motor Drive.
MANVILLE No. 1 Screw Slotter, Motor Drive.
SCIAKY Type RMCO 45-10 Elec. Spot Welder.
HUGH SMITH cap. 1" thick plate x 23' between housings Plate Bend. Roll. M.D.
VAN NORMAN No. 639 Oscillating Radius Grinder.

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#125 Dempster Scrap Baler, with skip pan loader. Charging box 60" x 22" x 16" deep.

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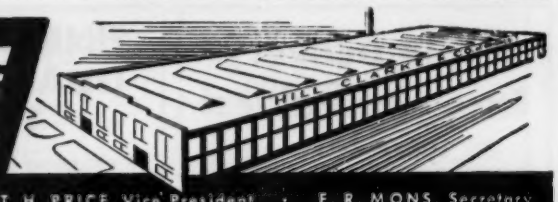

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Partial List

Automatics

1-1/16" Cleveland Model A (1942).

Boring Machines

No. DB2112 Excello Single End Borer
100" Niles-B-Pond Vert. Bor. Mill.

Drills

No. 2 Avey Cam Fd. Drill. 14" Swing.
2 Spdl.—24" SW.—No. 3 Avey
D-31 Fox Multiple.
No. 57H Fox 24 Spindle Multiple Drill (1943)

Gear Machines

11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
618-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.
No. 64 Fellows Gear Shaper.

Grinders

6"x18" Landis Type C (1942).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C cam Grinder.

Internal Grinders

No. 1109 Bryant Internal Gdr. (1951).
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16A-16 Bryant Internal Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 24-26 Bryant Int. Grinder.
No. 24-36 Bryant Internal Grinder.
No. 81 Heald Internal Centerless.

Hill-Clarke Norton Type Motor Driven Grinders

10"x36" Centers. 14"x36" Centers.
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24"x264" Centers.

Hones

Model H-2 Micromatic Horiz. Hone.
Model 200-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone

Lathes

8"x15" Automatic Lathe.
R-14 Lo-Swing Automatic Lathe.
18"x6' Am. Geared Head Lathe.
18"x8' Lodge & Shipley Grd. Hd.
27"x12' American Geared Hd. Lathe.
27"x12' centers LeBlond Lathe.
36"x18' Putnam Grd. Hd. M.D.

Turret Lathes

No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 4A Warner & Swasey Turret.
No. 6 Warner & Swasey, cone head.
2¼"x24" Jones & Lamson.
18" Libby, M.D.
No. 4A Warner & Swasey (1944).
No. 4A Warner & Swasey, Taper, Cross-sliding Turret (1942).

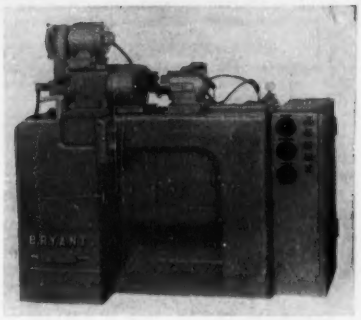
Planers

48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

Milling Machines

54" Ingersoll Vertical Adjustable Rotary Mill.
No. 08 Cincinnati Vert. (1942).
No. 12 Cincinnati Pl. Auto.
4" Taylor & Fenn Duplex Spline.
6"x168" Pratt & Whitney Thrd. Mill.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
12"x102" Mod. HT Lees Bradner Thrd. Mill.
54"x30"x16' Ingersoll Slab Mill.
No. 34-36 Cincinnati Hydro.

For more complete listing —see last issue or send for our latest "Green List" #163.



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#4 Cincinnati Vertical Mill Rapid Traverse
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Buffalo Hi Speed Drill, S.S. #3 M.T., Power Feed, Mfg. 1944
00 Hamilton Spur Gear Hobbing Machine, Mfg. 1951
Sheffield Model 121 Micro Form Grinder, Mfg. 1945
#4 Gisholt Preselector head, bar feed & tooling, Mfg. 1943
Style DB2112A Excello Single End Precision Boring Machine Mfg. 1944
Carroll Jamieson Lathes 16"x54", Mfg. 1951
#3 Gisholt Preselector head, Air chuck & cylinder Mfg. 1943
#5 Gisholt Preselector head, Bar Feed and tooling Mfg. 1943
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No. 2A WARNER & SWASEY Universal Turret Lathe, preselector head, bar feed, chuck, new 1943

No. 3A WARNER & SWASEY Turret Lathe, Timken spindle, electric chuck, tooling

No. 3 WARNER & SWASEY Universal Turret Lathe, 800.000 series

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5'-13" column CARLTON Radial Drill, AC motor & gearbox on base

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42" KING Vertical Boring Mill, 10HP AC motor, power rapid traverse.

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GORTON, 9-J Vert. Spdl. P.F., 1942
#3 CINCINNATI Vertical Dial Type 1942
KEARNEY & TRECKER, 2H, 1942
KEARNEY & TRECKER, 1H—18, mfg. new 1943
DEFIANCE, Duplex Hyd., 18"x48" table, tlmk.

GRINDERS

GALLMEYER & LIVINGSTON #4 Universal Tool & Cutter New 1944
SELLERS 6G Drill grinder MD, 1942
LANDIS 16"x42", Hydraulic Crankshaft.
HEALD #81 Sizematic 1943
EXCELLO 53-L, precision thread, new, 1943

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NIAGARA, 36" 10 Ga., 15" gap, M.D.
WALSH, #4 dble. crank Press M.D.
CLEARING, 215 ton, S.S., 10" STR., new 1941

LATHES, TURRET LATHES

RIVETT Model 608 U Precision 1944
BARDONS & OLIVER, #7, bar & chuck
GISHOLT, No. 5, Preselector, Bar Feed, 1942
GISHOLT, 2L cross sliding turret, tooling, M.D.

DRILL PRESSES

BAUSH W7 Hydraulic New 1945
FOSDICK 3 & 5 ft. Radial Drills
BARNES, No. 262 two-spindle, 1943.
LELAND-GIFFORD, 4 SP., #2 LMS, M.D., Late
ALLEN 6 Sp—#2MS New 1943

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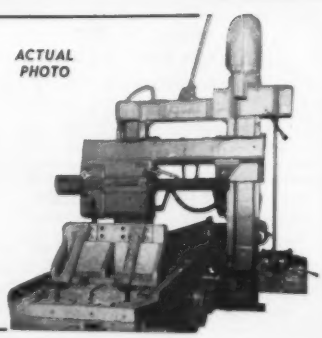

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FELLOWS: 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 8" dia. with many cutters
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INTERNAL GEAR GRINDER, GG-31

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FELLOWS: #12C Cone & Spacing Inspection Instrument
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PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

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VAN NORMAN: #649-16, cap. 6" to 16" dia.
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GRINDERS—THREAD
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LEES-BRADNER: CT-36 Thread Miller chucking type, 13½" hole
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OPTICAL PROFILE GRINDER, Sheffield, used
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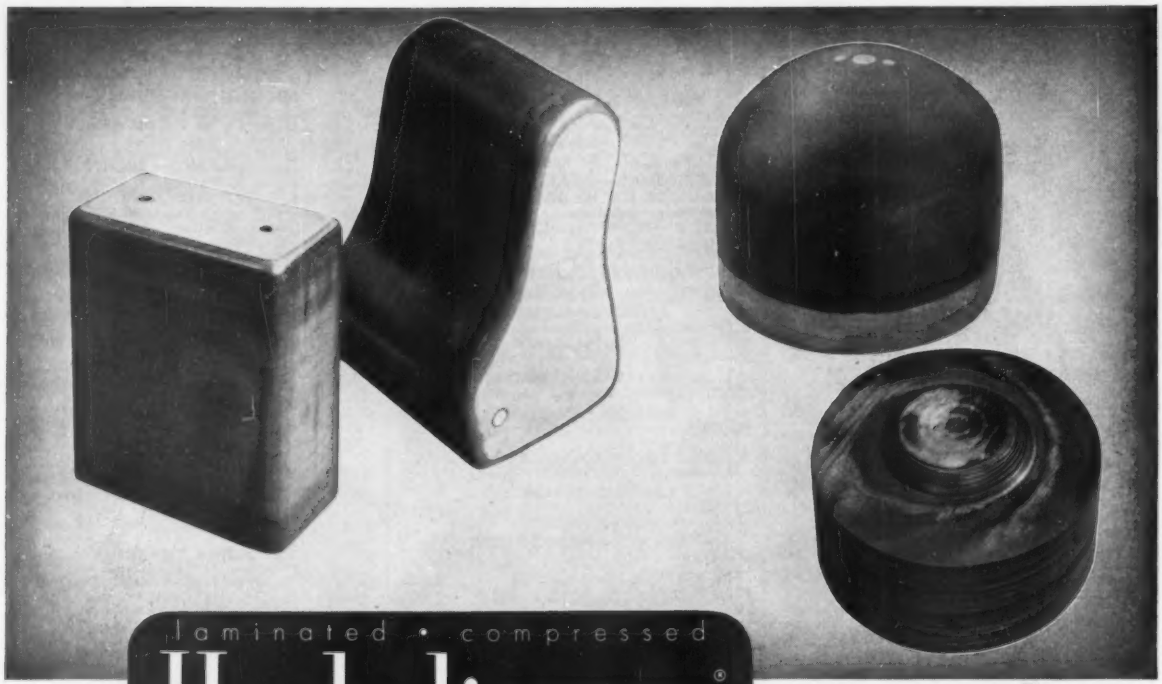

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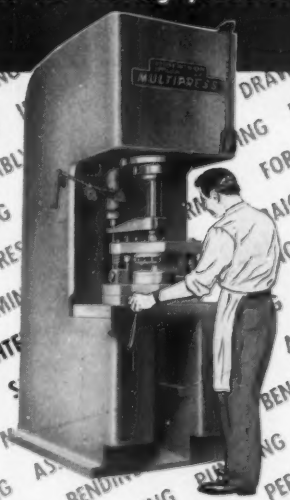

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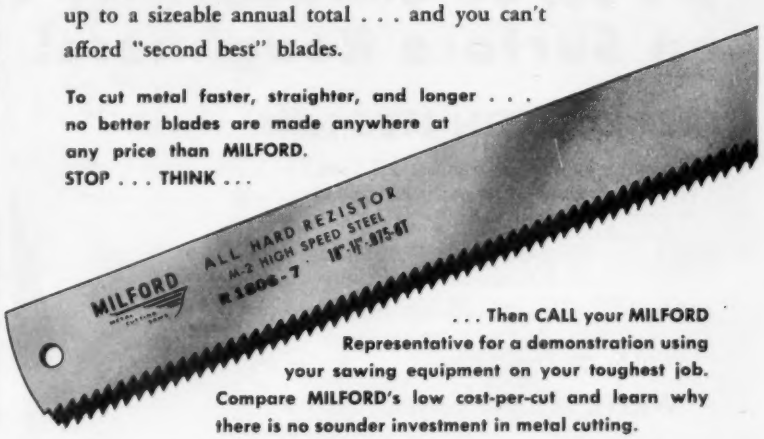

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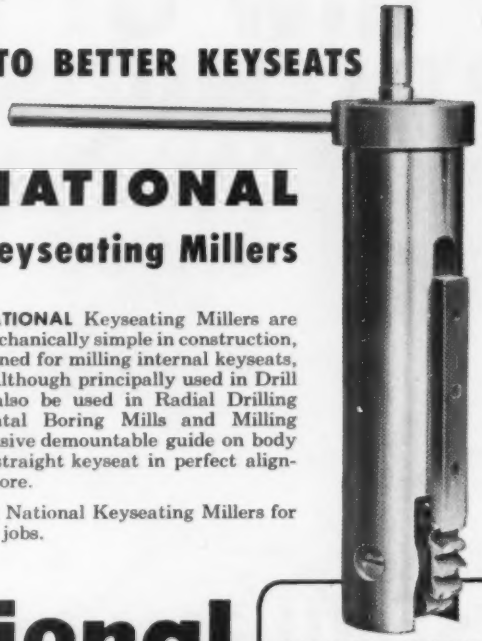

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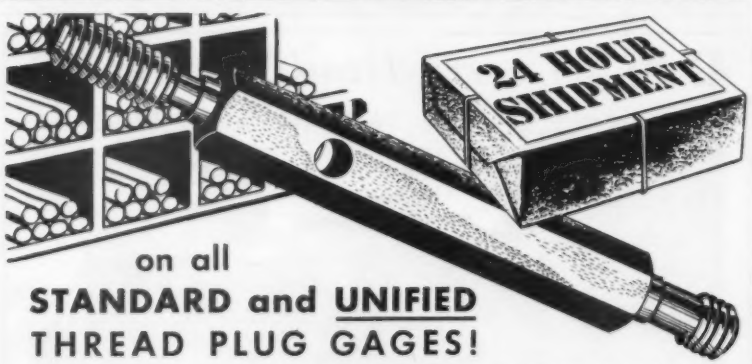

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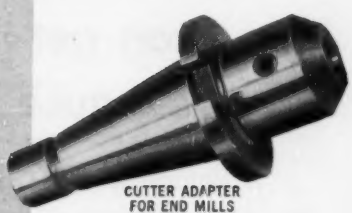

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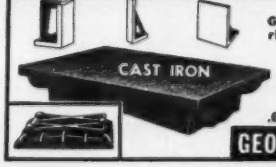

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"The Gift of Nature"

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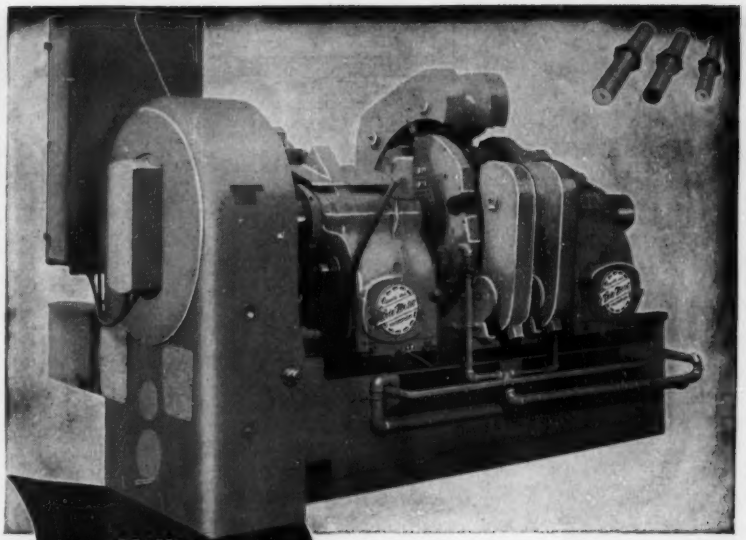

Milling and Centering Simultaneously and in Continuous Production

Here's an excellent example of how two entirely different operations can be combined on one machine. This Davis and Thompson continuous type Roto-Matic both mills and centers on both ends in one operation. Rough and finish milling cuts on the ends of the shaft and centering of both ends is completed with only one rotation of the fixture drum. The centering heads travel with the work station until centering operation is complete then drop back to next work station and repeat. Automatic equalizing clamping is provided to the fixture. Spindles have micrometric adjustment and spindle carriers are adjustable on the ways to accommodate shafts of various lengths.

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Drop-forged model with chrome finished micrometer head, from $9.25 up. Ask for Micrometer Catalog

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This tool with TUNGSTEN CARBIDE tipped anvils $15.75

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precision *beyond question*

The requirements exacted of surface grinding machines leave no room for variation. Precision and tolerance control must be built-in. Through the years Grand Rapids Grinders have demonstrated the highest quality and unquestioned dependability of performance. Upon this record they have been accorded world-wide acceptance as standard of the industry. Here is precision beyond question.

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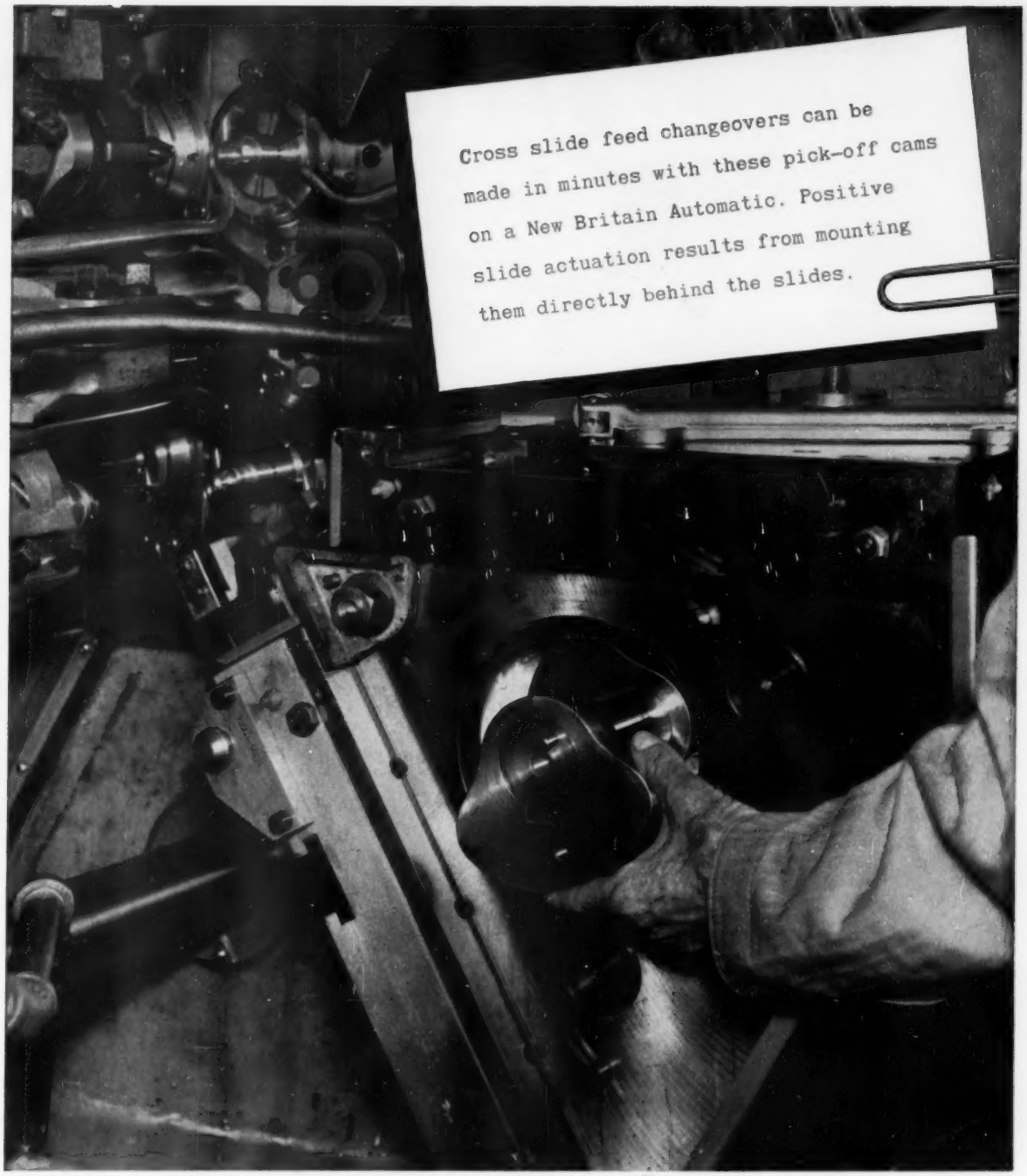
GRAND RAPIDS GRINDERS

GALLMEYER & LIVINGSTON

MANUFACTURERS OF SURFACE GRINDERS, CUTTER AND TOOL GRINDERS, TAP AND DRILL GRINDERS


Cross slide feed changeovers can be made in minutes with these pick-off cams on a New Britain Automatic. Positive slide actuation results from mounting them directly behind the slides.

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut

NEW BRITAIN *Automatics*

Machines for Making Progress

Automatic Bar and Chucking Machines
Precision Boring Machines
Lucas Horizontal Boring, Drilling and Milling Machines
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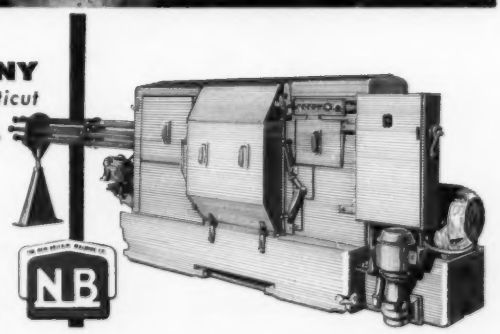


Achieves high production, high precision of difficult jet engine part

...with help of TIMKEN® bearings

TO insure high-speed precision machining of compressor discs for the J-34 turbo-jet engine, four Gisholt 4F Fastermatic Automatic turret lathes are set up in a two-man "production line". Each operator tends two lathes and they perform all machining in four pass-along operations.

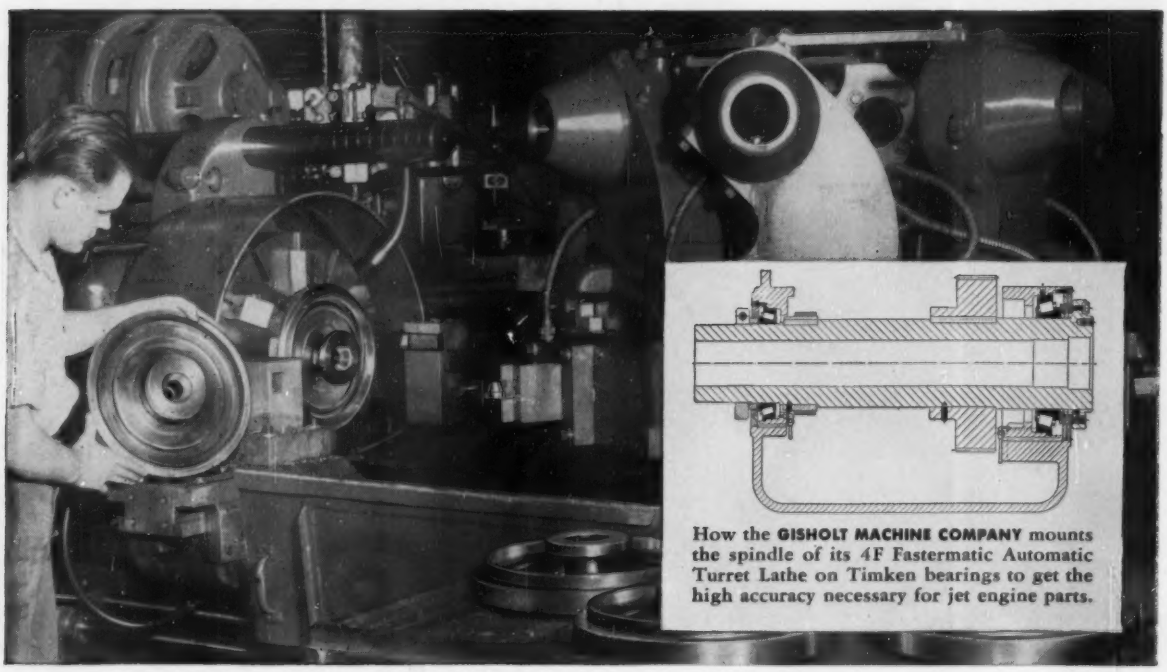
Just what these operations are, and the time it takes, are classified information, but it's no secret that it's a particularly tough assignment. These stainless steel compressor discs have a complicated shape, and must be held to extremely close tolerances.

Gisholt makes sure these lathes operate with high precision by mounting the spindle and gear train on Timken® tapered roller bearings. The spindle has adequate capacity for any load; line contact between rollers and races of Timken bearings provides load-carrying capacity to spare. And the tapered design of Timken bearings enables them to take radial and thrust loads in any combination. This holds spindles rigid and permits pre-loading to any desired degree to prevent chatter.

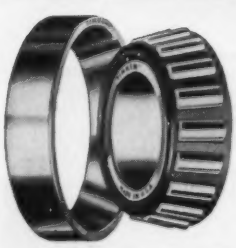
Timken bearings practically eliminate friction because of their true rolling motion and smooth surface finish. Made from Timken fine alloy steel—finest steel ever developed for tapered roller bearings—Timken bearings' rollers and races are case hardened for hard, wear-resistant surfaces and tough, shock-resistant cores. As a result, wear is reduced, maintenance minimized.

Next time you buy or build a machine tool, make sure it's equipped with Timken precision tapered roller bearings. Always look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How the **GISHOLT MACHINE COMPANY** mounts the spindle of its 4F Fastermatic Automatic Turret Lathe on Timken bearings to get the high accuracy necessary for jet engine parts.



TIMKEN

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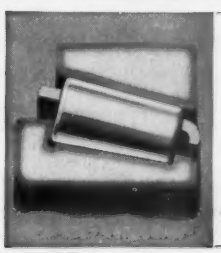
TAPERED ROLLER BEARINGS



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis Timken steels.

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION